

FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

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EDITORIAL COMMENT.

The Air Service Vote.

Col. Seely's memorandum on the Army Estimates, including a statement of the sum allocated for military aviation, is published as we go to press and is included in this issue, but it makes its appearance too late for comment, and in any case we should wish not only to hear Col. Seely's explanation of the situation in Parliament, but also to hear the First Lord's statement concerning the air service in his department before commenting upon so important a matter.

The Science of Model Research.

We draw attention to a paper on the law of similitude, which Mr. L. Bairstow read before the Aeronautical Society recently, published on another page, as it is one that should be perused studiously by all readers of FLIGHT. It will be the easier for those not commonly interested in scientific discussion to do this for the reason that it is one of the best written papers that has yet come into our hands. Delivered in simple language it goes straight to the point in the least possible

space, and it does so by the aid of a few analogies that serve to provide the reader with just that breadth of view that is so essential to a proper appreciation of such a subject.

For reasons that are obvious, it is impossible to conduct highly elaborate research on full sized aeroplanes, yet without question it is of the greatest importance to know the detailed behaviour in flight of the various members of which the machine is composed. Obviously this investigation can only be carried out on a reduced scale, and the point to which Mr. Bairstow draws attention in his paper is that there are certain very important laws connecting small scale experiments with the behaviour of full scale machines. It is clearly necessary for those who make small scale experiments to understand these laws, but it is also necessary that their importance and general nature should also be appreciated by all who make full sized aeroplanes. Not less is it desirable that the existence of the laws of similitude should be borne in mind by those who encourage themselves to take an interest in aviation by the flying of model aeroplanes.

As the author's paper itself is the clearest possible exposition of the subject with which it deals and is brief besides, we do not propose to summarise it here, but the present is, nevertheless, a fitting opportunity to pass a remark or two in appreciation of the work that Mr. Bairstow and his colleagues, Messrs. F. H. Bramwell, Harris Booth, J. H. Hyde, B. Melville Jones and others who are on the staff of the National Physical Laboratory, have accomplished. In their hands is the conduct of the actual aerodynamic research at the N.P.L. and the Technical Reports of the Advisory Committee bear good evidence that they make active use of their time. The Technical Report of the Advisory Committee has become what one might call the standard text-book for aeronautics in the English language, and it is a publication of the highest possible quality. Many of the memoranda contained therein have been prepared by those whose names have above been mentioned, and the practical value as well as the general interest of the Technical Report gains immensely from the care and lucidity with which this written matter has been compiled. Too often, those who are actively engaged in the conduct of practical work, whether on a full scale or a small scale, find some difficulty in making their chain of logic complete for the general reader when they come to report their conclusions for his benefit.

As for the accuracy and merit of the work itself that is carried out at the N.P.L., there can be no question; we firmly believe that it is the most accurate aerodynamic research that is carried out anywhere in the world. It was, however, by no means a necessary consequence that the results of this work should be so clearly set forth for the benefit of others, and while the Aeronautics "blue book" has many contributors whose names we have not mentioned and whose work is equally important and well described, we desire on this occasion more particularly to record our appreciation of the merit of the matter for which the aeronautics staff of the National Physical Laboratory is directly responsible.

Modern Tuition. A letter elsewhere from a pupil who signs himself "Ground Pilot" will be read with interest by all, and answered, we trust, by a good many. It relates to a matter of considerable importance, for our correspondent criticises the establishment of some of the flying schools and argues that the methods in vogue, so far from popularising aviation are in fact deterring more widespread advance.

The question is one that deserves to be ventilated in public and we hope that those who conduct schools for the tuition of pilots will not hesitate to come forward and take interested people into their confidence as to the true nature of the facts. We should have been less inclined to publish the letter in question had it not been that we have received complaints of a like nature before, although not always couched in equally reasonable language. In most cases, the main point of discord is that many so-called schools are in reality testing centres for finished machines and that the tuition part of the business is merely incidental to the other occupation.

Problems of this sort commonly resolve themselves into a question of finance. The pupil, even when he is "willing to qualify himself at considerable expense," commonly has a keen eye to an apparent difference in charges, and it may be that through one cause and another, tuition at the current rates is not the profitable business that our correspondent imagines it to be. We have, indeed, heard manufacturers aver as much, but we should like to see them come forward now with a few definite statements as to the real position. If it is not profitable to do the thing properly it is only natural that it should not be done well. On the other hand, some schools do appear to be run properly, as our correspondent admits, so the question arises as to whether or not these schools are profitable and if so why others are less profitable or, being as profitable, are run less well.

It may be argued, of course, that the pupil has only himself to blame if he chooses the wrong place, but

while this may seem reasonable to those with inside knowledge of the movement, the simplicity of selection is doubtless far less apparent to a member of the outside public who makes up his mind to fly. He has a right to expect reasonable equality of opportunity and we are inclined to feel that the time has arrived when he has the further right to expect some protection of his interests by the organisation that is avowedly in a position of authority. In short, we believe the matter is one in which the Aero Club might reasonably be expected to interest themselves along lines similar to those followed by the Royal Automobile Club in connection with schools of motoring. There were many complaints of a similar kind in this connection some years ago, and there is now no doubt that the concern that the R.A.C. took in the matter had a very beneficial influence all round. The Royal Aero Club issues pilot's certificates. We suggest that it might with advantage seriously consider the question of issuing instructor's certificates, and that it might further issue and annually confirm certificates to schools possessing approved tuition facilities.

It may be said that it is early days to interfere in these matters, but it is never too early to check justifiable dissatisfaction that is likely to interfere with the popularity of flying. If all the schools in the country were thoroughly popular and thoroughly efficient it would be an immense stimulus to aviation and incidentally it would, we think, do a great deal towards placing the Royal Flying Corps reserve on a more satisfactory footing than it is at present.

Not only should we like to see far more aerodromes in different parts of the country, but we should like to see them existing under the stimulus of a genuine enthusiasm. If the Government is really serious in respect to the reserve pilots, it might do much that it has not yet attempted to do towards that end by encouraging a little *esprit de corps* in the various flying centres. It is of interest to the nation and, indeed, it will in time become a matter of absolute necessity to have a sufficient number of suitable aerodromes in different parts of the country. If the Government took more interest in those that already exist it would pave the way to the establishment of others. It would cost the Government very little to maintain a few sheds at each of the aerodromes in the country and it would encourage pilots to join the reserve if they could house their aeroplanes in the Government sheds for a nominal charge. By some initial move of this character the first steps of a progressive development might be taken, and we commend it to the consideration of those concerned with the adequacy of our aerial forces.

THINGS WE SHOULD LIKE TO KNOW.

WHETHER aerial defence is wanted or not.

Why the expected million only came to £501,000.

Have they something up their sleeve besides a handkerchief.

If they are in the "know," but for obvious reasons cannot tell us, dare they say straight out that it is "all right."

Should we believe them if they did.

Is £501,000 better than nothing, or a sheer waste of money.

Whether half a loaf is better than no bread to feed a multitude.

Whether Col. Seely's speech at the Aero Club dinner was made in all good faith, and if so hasn't somebody "let him down."

If the hand that ought to rule the world is too busy rocking the cradle.

THE LAND THAT GOD MADE.

This is the land that God made.

These are our ministers wealthy born, who sit long hours and the "house" adorn, who make big laws but pull no corn, for the good of the land that God made.

We are the people all forlorn, who are willing to pay though tatter'd and torn, who put these ministers wealthy born, to sit in the "house" and it adorn, to make good laws and pull some corn, for the good of the land that God made.

These are our "Tommies" all heroes born, who often rise before the dawn, to practise flying at chilly morn, for the sake of the people all forlorn, who put the ministers wealthy born, to sit in the "house" and it adorn, who'll wake one morn to rave and storm, when they've lost the land that God made.

"WILL-O'-THE-WISP."

MARCH 22, 1913.

FLIGHT

MEN OF MOMENT IN THE WORLD OF FLIGHT. Designers.



MR. W. O. MANNING.

TEACHING FLYING.

By LEWIS W. F. TURNER.

[These remarks, expressed in simple, everyday language by Mr. Lewis Turner, who through 1912 was one of our busiest flying instructors, will be found of great interest. Mr. Turner was attracted towards aviation in the early days, and first tasted the sensation of flying by going up as a passenger with Mr. Grahame-White, when the latter pilot was flying at the Bournemouth Aviation Meeting in 1910. Following up his enthusiasm, he decided to learn to fly, and, selling his motor business in Dorsetshire, he joined the Grahame-White School at Hendon. That was towards the end of February, 1911. He obtained his flying credentials on April 1st, having the distinction of being the first pilot in England to obtain his brevet after the new right-hand turn test regulations came into force. Thus qualified, he joined the since defunct Aeronautical Syndicate Flying School as Pilot Instructor, and flew Valkyrie monoplanes. Leaving that School in August, he went to Russia as Chief Pilot and Engineer to the Kennedy Aviation Company of St. Petersburg. Returning to England in January of last year, he was engaged by the Grahame-White Aviation Company as Chief Pilot and Instructor to the School. Throughout the season until November, when he left that firm, he flew practically every day in all sorts of weather, and had charge of the School instruction work, proving a most painstaking tutor. Mr. Turner is now engaged as Chief Pilot to the W. H. Ewen Aviation Co.'s Schools at Hendon and Lanark.—Ed.]

NOWADAYS it is safe to remark that any pupil who can keep a fairly clear head and who has quite an average amount of common sense can soon learn to fly. He does not need to be an expert at engineering, or particularly well versed in the aero dynamical considerations underlying the flight of an aeroplane. If he is an expert in both these subjects, so much the better, for with an engineer's knowledge he should have an engineer's instinct, and instinct plays a great part in the making of the future airman. A man, to be a good flyer, must necessarily have complete sympathy with his machine. He must not use it harshly, making violent movement with his controlling levers. He must use them gently, and almost you might say, persuasively. There is a great similarity between sailing a boat and flying an aeroplane. On a boat, in changing from one tack to another, you swing the rudder round gently but forcibly. If you were to throw it over suddenly, your boat would not answer her helm anywhere near as well. The same applies to an aeroplane, and personally I find that the best results are obtained by gentle and careful manipulations of the lever. Flying, in a gusty wind, sometimes you have to make harsh movements, but that scarcely concerns the pupil, as his work is confined mainly to flying in relatively calm air.

There is a distinction between putting through a pupil for his certificate and turning out a really efficient pilot who is capable of doing good, plain, straightforward flying without taking unnecessary risks. Some people have an idea that all you have to do to learn to fly is to sit in an aeroplane, have the engine started up, get off the ground, steer the machine about and keep on flying indefinitely as long as the engine remains running. If this were so, flying would indeed be easy. As a matter of fact, it is not difficult by any means, but apart from the actual handling of a machine in the air, there are such things to be learnt as the correct adjustment of controls and wires, the means whereby a sweetly

running engine may be always obtained, and so on. There are such things as plugs, magnetos and carburettors, which must be under constant supervision to see that they are doing their work properly. There may be a faulty wire. An oil pipe may become choked. For all such things as these the pupil must be taught to keep a constant look out. As regards actual flying, the pupil who goes steadily, absolutely mastering the points of his first lesson before trying other things which are beyond him, is generally the one who will make the most rapid and thorough progress. Above all, he must pay particular attention to the advice of his instructor. A pupil who is over ambitious rarely gets through his tuition without a smash of some kind, which, although he may escape uninjured, often makes him nervous for some time after, thus, of course, checking his progress. If he does not actually have a smash he will probably come very near to it, and this, most often, has the same effect.

Another thing a pupil will do well to remember is to rely upon himself and his own capabilities, and never trust to luck. He should pay no attention to any superstitious nonsense which is often heard on an aerodrome. One popular superstition is, that when one smash occurs, two others are bound to follow during the day. There is such a thing as your subconscious mind having a reflex on your actions. If a pupil goes out to fly with the idea in his head that, according to superstition there ought to be two other smashes that day, he will probably suffer one of them.

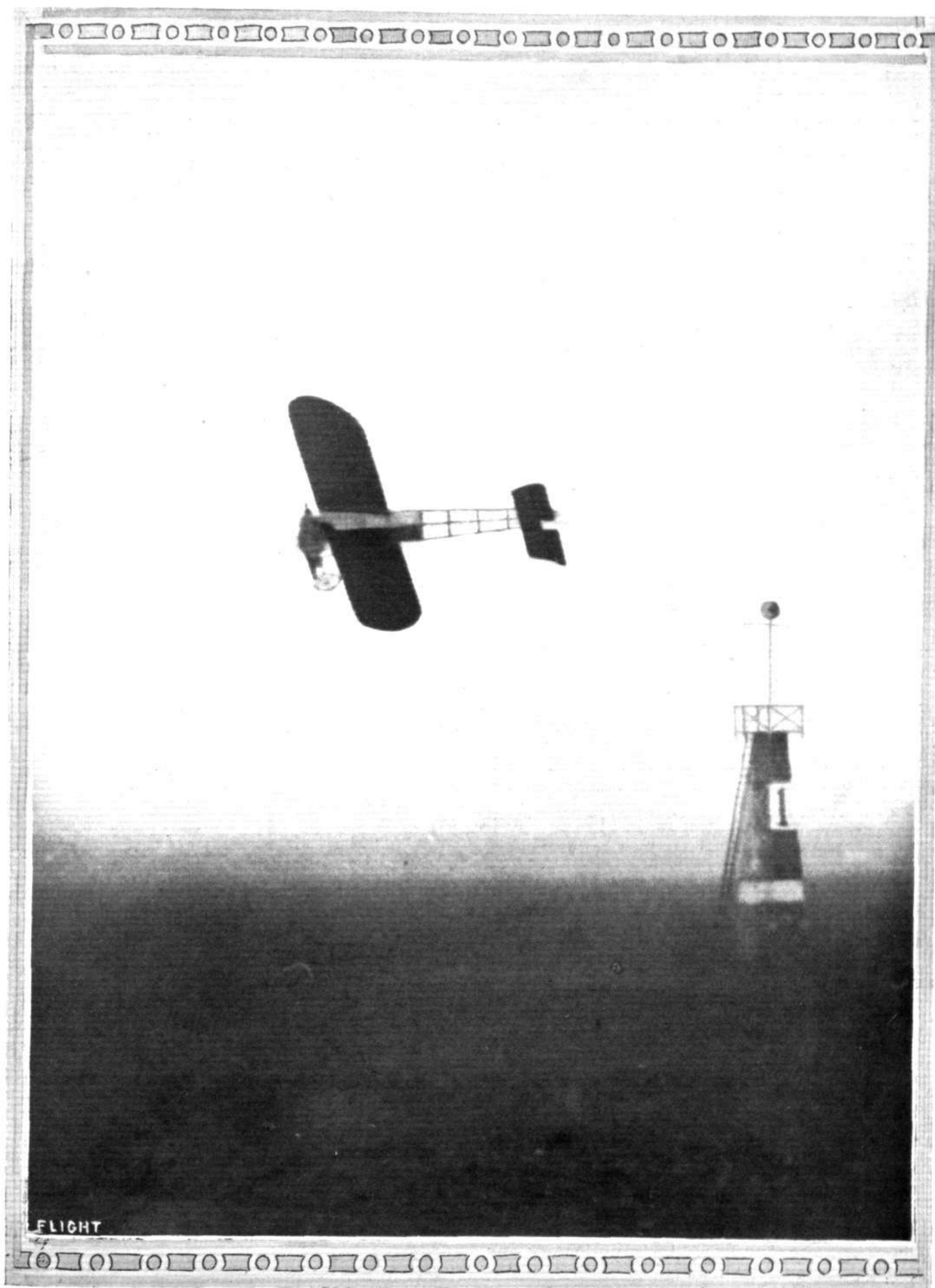
Mascots are much in vogue with some aviators, and although they undoubtedly have some sentimental value, it is of course absurd to believe that they are of any material use in preventing accidents. Personally I have quite a large collection, in fact, if I were to wear them all, I should probably be taken for a Ludgate Hill toy hawk. But whether I wear any or not, my luck, or whatever you like to call it, is invariably the same.

A pupil's first knowledge of aviation is always to be gained in the hangar, where he can learn the working of the controls and become familiar with the different parts of his machine and their adjustments. Then he is taken up as a passenger by one of the school pilots, and this gets him used to being in the air, and to having an extremely noisy engine just in front or behind him. Incidentally, by keeping an eye on the pilot he will see just what movements are required to correct any variation in the attitude of the machine in the air. After a series of passenger flights he is allowed his first practical lesson, commonly termed "rolling." He is put on to a low-powered machine and is permitted to drive it across the aerodrome without leaving the ground. At first he may find a difficulty in keeping the machine on a straight course, but very soon he will pick up the "feeling" of his rudder and be able to run along the ground in a straight line without difficulty from one end of the aerodrome to the other. Having got to that stage, and still keeping up the passenger flight treatment, he is allowed to go out on a higher-powered machine. At first he keeps his engine throttled down and continues to roll until he gets used to being on a different machine. Then he is told to speed up his engine and is permitted to make short hops, using his elevator control gently to lift the machine from the ground and then immediately to return to it. In his early flying practice there is a most important point for the pupil to learn, and that is, never to switch off the motor should he find himself in a difficulty. On a motor car, if there is some difficulty ahead, it is usually right to throttle down the engine and throw out the clutch. But with an aeroplane it is the reverse, for the greater the difficulty you get into, the greater is the engine power necessary to get you out of it. Gradually the lengths of his hops increase, until he is capable of making straight flights the full length of the aerodrome, keeping a few feet off the ground. He is kept at this for some little while, increasing the height of his flights as he gains confidence. The pupil should not be hurried over this stage, because, above all, he is getting good practice at *vol planés*, and landings, which are very important.

He is now ready for a left-hand turn, and is sent out to make half turns, using his rudder very slightly at first. He progresses, and eventually succeeds in flying a complete circuit. On reaching this



Mr. Lewis Turner explains the controls of the Caudron biplane to a new pupil.



Mr. Gustav Hamel making one of his banked turns at the Hendon Aerodrome.

stage he can consider himself well on the way to getting his much-coveted "ticket." Having had plenty of practice at turning to the left, he will attempt to turn to the right. This, in the past, was considered the most difficult task for the pupil, but familiarity has brought with it contempt, and now the right-hand turn is considered to be quite as easy as turning to the left. When proficient with the right-hand turn it is quite a simple matter to fly a figure of eight. With all the experience that he has had up to that point he will not feel any anxiety about flying up to a height of fifty metres, which is the altitude that a pupil must obtain before he can be granted his certificate.

By now the pupil has virtually come to the end of his school tuition, and all that remains to be done is to advise the Royal Aero Club of his readiness to be examined. In his tests he will be required to make two distance flights, each consisting of five figures of eight, flown round marking posts situated not more than 500 metres apart. He must also make an altitude flight as I have mentioned before, going up to fifty metres, but this may be included in one of the distance flights. On each occasion he must land within fifty metres of a pre-determined point, and must not use his engine again after touching ground.

Providing he has satisfied the R.Ae.C. observers, he may consider himself a fully qualified pilot, and, in consequence, being

pleased with himself and with everything in general, he will undoubtedly follow the usual course of running up to town and standing himself a very excellent dinner on the strength of it.

Another system of tuition is that of dual control. This method consists of the pupil taking numerous flights with an instructor on a machine that is fitted with two sets of controls, so that either may take charge of the machine in the air. Thus the instructor can correct any mistakes that the pupil may make. By this method of instruction a pupil can probably be put through his course of training in a little shorter time, but, in my opinion, it is apt to make him rely too much upon the capabilities of his instructor, thus robbing him of that self-confidence which is so necessary.

Concluding, let me say that the possession of a Royal Aero Club certificate does not necessarily mean that the holder is an expert pilot, for there is invariably a considerable amount to learn before he becomes one. The newly-qualified pilot has as yet only been allowed out in relatively calm weather, and has yet to know what it is to fly in a really bad wind. There are also to be mastered machines which fly somewhat faster than those he has learnt on. As a matter of fact, it is doubtful whether anyone really finishes his tuition, for no one is so wise that he cannot be taught something new, and the best pilots of to-day have still much to learn and many stiff problems to overcome.

QUESTIONS IN PARLIAMENT.

ON Wednesday week in the House of Commons, Mr. G. Locker-Lampson asked the Secretary of State for War whether serious delays have taken place in the fulfilment of orders placed by the War Department with British manufacturers of aircraft; what steps he proposes to take to accelerate the construction of these machines; and whether given periods of time may be fixed to determine the limits of construction for dirigibles and aeroplanes.

Col. Seely replied that there have been serious delays in some orders, but the experience gained by the contractors in these instances should tend to obviate delay on further orders given, and more firms are being encouraged to build to the War Office requirements. It was not considered practicable at present to fix any time limit to govern the construction of dirigibles and aeroplanes under War Department contracts, in view of the very varied conditions which have to be taken into account.

On the following day, a similar question was addressed to the First Lord of the Admiralty, to which Dr. Macnamara replied that aircraft for naval purposes are at present in an experimental stage of development, and there have been a good many delays in manufacture due to this cause. In proportion as naval requirements become settled, rapidity of manufacture will become practicable. It would not be reasonable in present circumstances to make contracts unduly strict in respect of the time allowed for construction.

Mr. Joynson-Hicks asked the Secretary of State for War whether, in consequence of the report on aeroplane accidents by the Committee appointed by him, he is permitting the renewed use of monoplanes to the Royal Army Flying Corps, and whether he intends to use both kinds of machines in the future. He asked further whether any of the Flanders, Deperdussin, and Martin-Handasyde monoplanes delivered during the past four months for the Military Wing, Royal Flying Corps, are in flying order, if so, how many of each, and, if not, in what state they are at present; and whether the Nieuport, Blériot, and Bristol monoplanes, bought for the Military Wing, Royal Flying Corps, prior to October, 1912, are in flying order, if so, which of them are fit to fly, and, if not, why they are not fit.

Col. Seely: All the machines referred to are in flying order, but are not being flown pending some alterations in conformity with the recommendations of the Monoplane Accidents Committee.

Mr. Joynson-Hicks asked the right hon. gentleman whether he is aware that a French Parliamentary Committee has been appointed to report upon aviation from a military standpoint; and whether, having regard to the importance of an adequate organisation to this country, he will appoint a Select or Departmental Committee on the subject.

Col. Seely: In France there is a special commission for the study of military aviation, and the Budget Committee has a sub-committee for the study of aeronautics. As regards the second part of the question, these matters are dealt with by a special sub-committee of the Committee of Imperial Defence and by Lord Rayleigh's Advisory Committee on Aeronautics.

Mr. Joynson-Hicks asked whether the total effective aeroplane strength of the Military Wing, Royal Flying Corps, is made up as follows: No. 2 Squadron, two "B" biplanes and three Maurice Farman biplanes, at Montrose; No. 3 Squadron, one "B" biplane and two Maurice Farman biplanes, at Lark Hill; No. 4 Squadron, two Bréguet biplanes and two "B" biplanes, at Farnborough; if

any of these squadrons possess any more aeroplanes, what such aeroplanes are, and whether they have been flown by officers of the Royal Flying Corps.

Col. Seely replied: It is not considered to be in the interests of the public service to publish the detailed distribution of aeroplanes. I will make a full statement as to the total numbers on the introduction of the Army Estimates, but I may say at once that the statements in the question are not accurate. All the machines now with the Royal Flying Corps have been flown by officers of the corps.

The Aerial Navigation Act Regulations.

In the House of Commons on Wednesday week, Sir J. D. Rees asked the Home Secretary whether airships travelling at a height of over 3,500 ft. can be identified or attacked, and what steps the Government proposes to take to enforce the regulations recently issued under his authority.

Mr. McKenna: The answer to the first point depends on the state of the weather. In normal weather the form and type of the airship will in most cases be sufficiently distinguished for purposes of identification. Where the regulations are contravened the police will deal in ordinary course with the offence, if the airship lands. Airships which do not land when signalled to do so will be dealt with by the military authorities.

Mr. Hunt: Will the right hon. gentleman say how an airship is to be dealt with at night?

Mr. McKenna: If they land they will be dealt with. If they fail to land the hon. gentleman should address his question to the military authorities.

Sir J. D. Rees: Does the right hon. gentleman think the regulations really are a serious proposition in existing circumstances?

Mr. McKenna (emphatically): Yes, sir, most serious.

ROYAL FLYING CORPS (MILITARY WING).

WAR OFFICE Summary of work during week ending 14th March, 1913:—

No. 1 Squadron.—In the early part of the week the wind was very suitable for kiting work, and about 40 ascents were made. On Wednesday, the "Beta" underwent an 8 hours' test, going to Folkestone and back, and finishing up with a tour of the country round Aldershot. The following day the "Beta" was put through some climbing tests. The "Gamma" carried out a long reconnaissance flight, observing the operations of the Officers Training Corps. On Friday, the wind was again favourable for kiting, and numerous ascents were made.

No. 2 Squadron.—Throughout the week the weather at Montrose was very boisterous, but most of the officers managed to put in a certain amount of flying during temporary lulls in the wind.

No. 3 Squadron.—A good deal of flying took place during the week. Several officers carried out reconnaissance flights over the opposing forces in a field day of the Officers Training Corps on Thursday.

No. 4 Squadron.—Numerous flights were made on Wednesday and Thursday, the nine officers having returned from the Central Flying School after passing their technical and theoretical examination. A new 70-h.p. Renault B.E. machine was out testing, with very satisfactory results. It is shortly to be fitted with "wireless."

THE GOVERNMENT AND AVIATION.

THE following is the text of Col. Seely's reference to aeronautics in his statement introducing the Army Estimates, published on Monday night:—

When the Army Estimates of 1912-13 were prepared it had been decided in general terms to establish a Central Flying School for the instruction of Naval and Military officers, but no establishment for that school, or for military flying units, had been formulated. The course to be followed in developing military aeronautics was laid down by the standing sub-committee of the Committee of Imperial Defence on Aerial Navigation in their report dated March, 1912, and the organisation of the Central Flying School and of the Military Wing of the Royal Flying Corps was then immediately taken in hand. Work was at once commenced on the lands and buildings for the Central Flying School, which is now in working order and provided with all the staff recommended in the Committee's report. One class of officers has already been passed through the school, and a second class is now under instruction. It was decided to begin the organisation of the Military Wing by the formation at Farnborough and Salisbury Plain of one Airship Squadron and three Aeroplane Squadrons in the year 1912-13, out of the total of eight squadrons recommended by the Committee as a suitable establishment to meet the requirements of the Expeditionary Force. The total strength of the Military Wing and school, including officers holding certificates but not yet admitted to the school, and Reserve officers, is now 123 officers and 598 men, of whom all the officers except 3 are qualified aeroplane fliers; 8 men have also been trained as fliers.

The Royal Flying Corps.

The fifth and sixth squadrons will be raised in the course of 1913-14, and a scheme for locating one of them in the Eastern Command has been worked out. Meanwhile, accommodation being available at Montrose, a temporary flying station has been formed there, and the necessary land for practice has been secured. Men of the Royal Flying Corps (Military Wing), after 4 years' service, will pass to the Reserve, where they will remain available for completing units on mobilisation and for supplying wastage. As it will be some time before this reserve begins to grow, arrangements have been made to form a Special Reserve of the Royal Flying Corps, consisting of two classes: men who will enlist for a period of 4 years and will perform a short annual training, and skilled mechanics already employed in the aeroplane industry, who will do no military training in peace, but will undertake for an annual bounty to come up on mobilisation. The supply of aeroplanes has proceeded more slowly than could have been wished. Considerable difficulty has been experienced in obtaining machines, either of British or foreign make, and from various causes there has been great delay in delivery by almost all the makers. The experience gained, however, of the practical use of machines by the Military Aeroplane Competition, held in August, and by the researches of the committee which was appointed to consider the question of accidents to monoplanes, has made the selection of machines for future supply very much easier, and has also made it possible to estimate the resources of the aeronautical manufacturing trade in this country, and I confidently anticipate a great improvement in this respect. The greatest difficulty still experienced is in the supply of aeroplane engines of British manufacture, but in conjunction with the Admiralty I am taking active steps to remedy this weakness. To enable the aeroplane squadrons to maintain themselves efficiently in the field a large amount of motor transport of special design is required. The designing and provision of this transport is in progress, and meanwhile transport vehicles of standard types have been purchased which admitted of being made available, with slight alterations, for the use of the Royal Flying Corps.

Work on Airships.

Work on airships suitable for military purposes is proceeding in the Royal Aircraft Factory. Difficulties have been experienced in obtaining a sufficient number of skilled mechanics, owing to the fact that men skilled in the construction either of aeroplanes or of aeroplane engines are in this country few, and those that exist are mostly in permanent employment of private firms at very high rates of wages. This difficulty will be greatly lessened in future by the

efficient training which mechanics are receiving at the Central Flying School and in the Military Wing, and every effort is being made to bring the technical training of the air mechanics of the Royal Flying Corps to a high standard. Provision has been made in these Estimates to raise the number of Regular officers and men of the Military Wing to over 1,000, in addition to the staff of the Flying School, and to those whom it is hoped to secure on a Special Reserve basis, and also to largely increase the number of machines available. Much has been accomplished in the past twelve months, in spite of the initial difficulties inseparable from a new departure of the kind; and I look forward confidently to the establishment on a permanent basis, during 1913-14, of six out of the eight units required to complete our Expeditionary Force. Excluding provision for land, the sums taken in 1913-14 compare with those taken in 1912-13 as follows:—

	1913-14.	1912-13.
Establishment of Army personnel, including Special Reserve and premiums for pilots' certificates	£ 150,500	£ 28,000
Staff of school	18,500	5,000
Aeroplanes, mechanical transport, stores, and materials	285,000	161,000
Buildings, including Army share of school buildings	72,000	38,000
	526,000	232,000
Less Admiralty contribution towards school	25,000	14,000
Net provision	501,000	218,000
Increase	283,000	

Provision (not included in the above figures) has also been made for guns for the attack of aircraft.

Special Reserve.

The establishment is reduced by the closing of the Field Artillery branch, in connection with the reorganisation of that arm described above. The men now in this branch will serve out their present engagements. There has been an increase of 140 officers in the past year, as compared with an increase of 70 in the year before, and I trust that in the future this recovery of strength will be further accelerated. The number of men again shows a loss of about 1,800 during the year. During the past summer the loss by absence and by purchase of discharge, both closely connected with emigration, was exceptionally heavy, while owing to the state of employment recruiting continues to be slack. I am not without hope that the deliberations of the Committee now sitting, to which members of both Houses of Parliament are lending their valuable aid, may result in finding a means of counteracting the causes which for some time past have been tending to weaken this Force.

The Navy and Aviation.

In his statement introducing the Naval Estimates in the House of Commons on Thursday week, the First Lord of the Admiralty, Mr. Winston Churchill, said substantial progress has been made during the year with the newly-formed Air Service. The Central Flying School of the Royal Flying Corps has been established on Salisbury Plain, under the administration of the War Office, and a Captain of the Royal Navy has been appointed as the first commandant of the School. Four naval and marine officers have also been appointed on the staff, of whom two have been graded as squadron commanders. The development of the Naval Wing is progressing rapidly, and an Air Department has been created at the Admiralty to deal with all questions affecting the air services. Good progress has been made with the aeroplane section at Eastchurch, and close attention is being given to the establishment of air stations along the coast. The progress with the hydro-aeroplane has been satisfactory. The work of training has been and is proceeding steadily both at the Central Flying School and Eastchurch. The needs of the airship section of the Naval Wing are also being closely studied, and a naval airship station is being established in the Medway. By arrangement with the War Office, officers and men have been trained at Farnborough with the military airship and kite squadrons. Two airships of the Astra Torres and Par-eval types have been purchased for instructional and experimental purposes.

Military Aviation in Italy.

The special commission which has been studying military aviation in Italy has presented a report recommending the establishment of an autonomous aeronautic corps open to all branches of the service. The commission has also recommended the immediate organisation of a central aeronautic institute.

The Swiss National Fund.

WITH the object of kindling public enthusiasm in the Swiss National Fund for aviation, the Swiss pilots Audemars, Maffei and Favre have arranged to make exhibition flights in different parts of the country. It is stated that already £4,000 has been promised towards the fund.

THE LAWS OF SIMILITUDE.*

By L. BAIRSTOW, A.R.C.Sc.

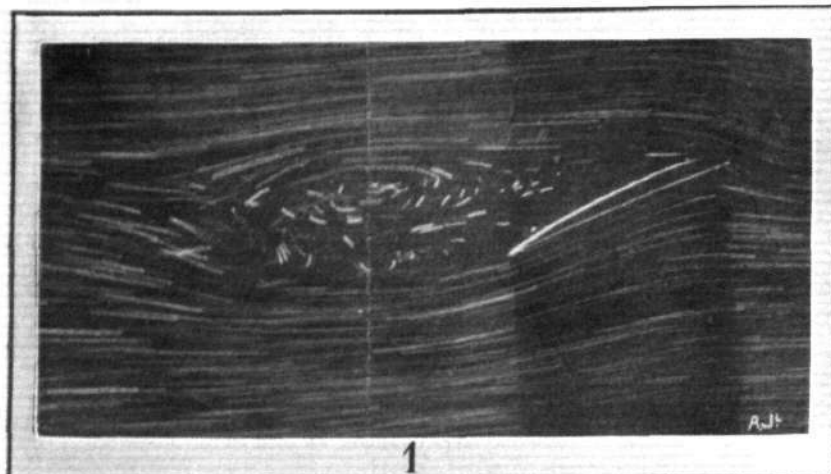
THE title of the paper does not immediately suggest aeronautics, but the connection is very intimate, as the laws of similitude constitute

can have a theory which tells us how to get the same results from two models, and that even when we cannot see the motion. This is the principle of similitude. The laws are not always simple, and there are an infinite number of them, only one of which is applicable to a given experiment. I hope to be able to show how we decide which law will be appropriate to the various motions with which aeronautics is concerned.

In the allied subject of ship-propulsion, as we all know, the testing of models of ships has been carried on for years, and the law of similitude is there embodied in the statement that models should be tested at a speed which is related to the speed of the ship in proportion in the square root of the length of the ship expressed as a multiple of the length of the model.

This law is known as Froude's law of corresponding speeds. On investigation it is found that this condition is necessary in order to make the waves of the same shape to scale for both the model and the ship. As there are no surface waves in air, it will not be surprising that the same law is not applicable to experiments on the lift and resistance of planes. On the other hand, it is applicable to some of the problems incidental to the study of the stability of aeroplanes,

but obviously not because of the production of surface waves. The theory involved in the laws of similitude is strictly accurate



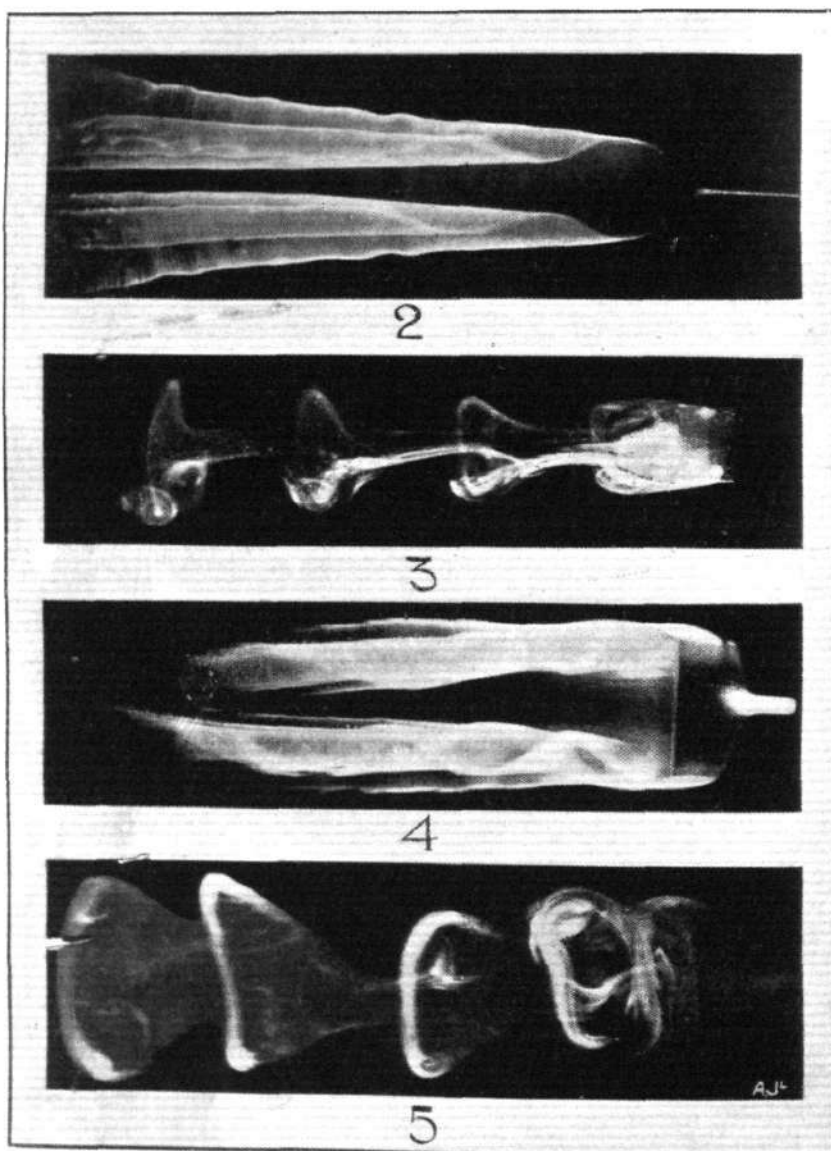
the theory of the use of models. Aeronautics, or rather aerodynamics, is almost entirely an experimental science at present, and a glance backwards through time will show how much of the fundamental data of the subject is derived from experiments on models. We have, in the first place, Langley's researches, which showed that sufficient lift could be obtained to make models fly with such light engines as he was able to construct. The development of the petrol motor removed the greater part of the engine difficulty, and, with that out of the way, Langley's figures for model planes, modified by Lilienthal's experiments on cambered models, provided the initial information from which the earliest flying machines were constructed.

It is true that the balancing of aeroplanes, as introduced by the Wright Brothers, was a revolutionary achievement carried out in the first instance on a full scale glider, but the later considerations of inherent stability were first enunciated by Mr. Lanchester from experiments on models, whilst the data underlying Prof. Bryan's mathematical investigations of stability are obtained solely from experiments on models.

All constructors of aeroplanes are familiar with the model researches of Eiffel, and use his results in their drawing office practice. They are also aware that full scale experiments are very difficult to carry out. At the present time the recorded full scale measurements are extremely few in number, and are confined entirely to determinations of thrust and gliding angle. They are not nearly advanced enough to be used for a determination of the best form of aerofoil or strut. This being the position, it is evident that we must still continue to make experiments with models, and in doing so must ask ourselves whether the flow round models is like that round the flying machines, and, if not, we must know how to find our conversion factors. A true theory of aerodynamics would answer those questions for us completely, but unfortunately for us the answers to such questions are beyond the reach of our present mathematical knowledge.

The slide illustrates a motion which has defied the mathematician. The object in the centre is an aerofoil looked at from one end, and the streaks are the tracks of brightly illuminated oil drops. The exposure was one second, and during that time each drop had been moving. The length of the trail shows the average velocity. In one part the fluid is still, in another it is moving very rapidly. Over the back the pressure of eddies is clearly shown. A satisfactory theory of hydrodynamics would be able to predict all this for us; as we have not got such a theory, the results have to be obtained experimentally by some such method as that by which the slide was produced.

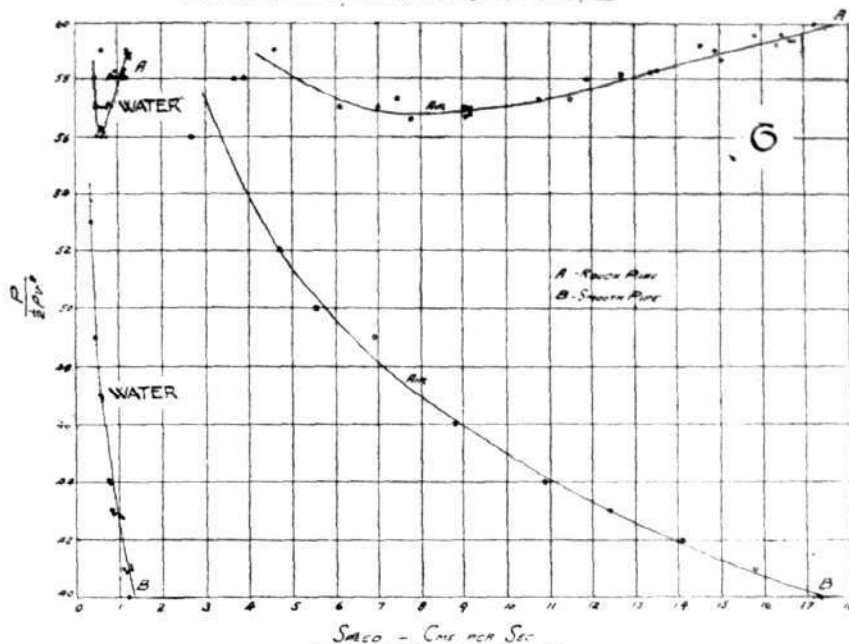
Although we cannot predict the motion in any given case, we



and is just as true as Newton's laws of motion. It is, in fact, an exceedingly direct application of those laws to experiment. The data to which the theory applies are experimental, and the accuracy

* Paper read before the Aeronautical Society on February 12th.

FLUID FRICTION IN TWO BRASS PIPES 1/8" DIA.



of the results is therefore dependent on the truth of the experimental conclusions.

A simple illustration will show the whole process of reasoning involved from the beginning of an experiment to the development of the law of similitude corresponding to it. Suppose, for instance, that we have been making experiments on a simple pendulum, and that as a result we have found that any alteration in the length produces a very appreciable influence on the time of oscillation. We have also found that the forces producing the oscillation are due to the attraction of the earth on the pendulum bob. If the experiment is made in air, there are also small effects due to air resistance, but when the experiment is carried out in a vacuum, as it often is, nothing else appears to affect the motion.

The experimental evidence is now complete, and the following theoretical problem can be investigated:—

“The time of swing of a simple pendulum depends on its length, l , on the value of g at the place, and on nothing else. Find the law connecting the time of oscillation with the length and attraction.”

The complete solution to the problem by means of a differential equation is well known to all engineers in the form $T = 2\pi \sqrt{l/g}$.

Except that we cannot say that the constant outside the root sign is 2π we can obtain this answer without reference to differential equations. To develop this method we turn to Newton's laws of motion, and from them we discover that all measurements connected with motion can be expressed in terms of the units of mass, length and time, this being usually referred to as the theory of dimensions.

In the above equation we have $T = \sqrt{\frac{L}{LT^{-2}}} = T$

and the dimensions on both sides of the equation agree. In fact any failure to obtain agreement is a certain sign of error in the calculation. The important point to notice is, that it is impossible to find any other combination of the two quantities l and g which

will have the dimensions of T . Hence we can say that because the dimensions agree we must have $T = \text{constant} (\sqrt{l/g})$.

The process for finding the laws of similitude is simply that of finding the only arrangement of all the quantities which matter, so that the dimensions on both sides of an equation agree.

If we apply the method to dirigibles and ask ourselves “If several dirigibles are made to the same drawings but to different scales, which is most likely to break, the smallest or the largest?” then since the design is fixed, the stress depends only on the size l , and on the weight of the materials of which it is made w lbs. per cubic foot and we write $\text{Stress} = f(w, l)$.

It is required to combine l and w so that the answer has the dimensions of stress. The only possible answer is

$$\text{Stress} = \text{constant} (w/l).$$

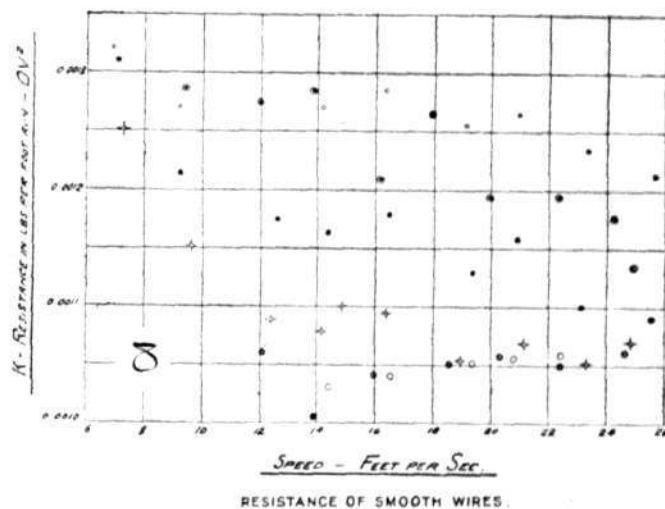
If the materials are the same from one size to another, w is constant, and we see that the bigger the dirigible the bigger the stress, and that doubling the size of an airship without altering the drawings or material reduces its factor of safety to half.

The application to similar aeroplanes which are to travel at the same speed is equally easy, and we find that increase of size does not produce difficulties due to increased stresses.

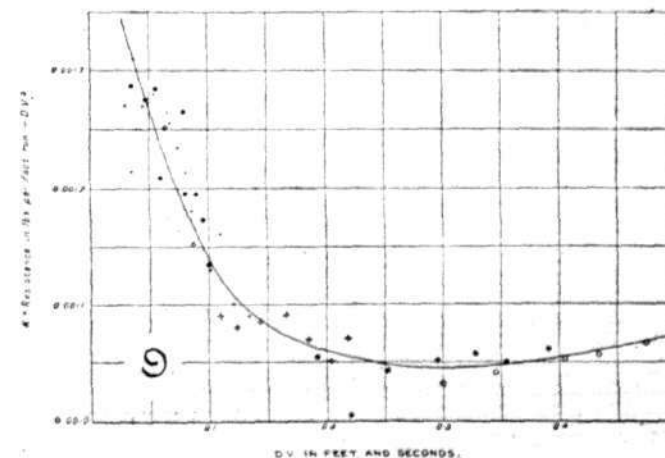
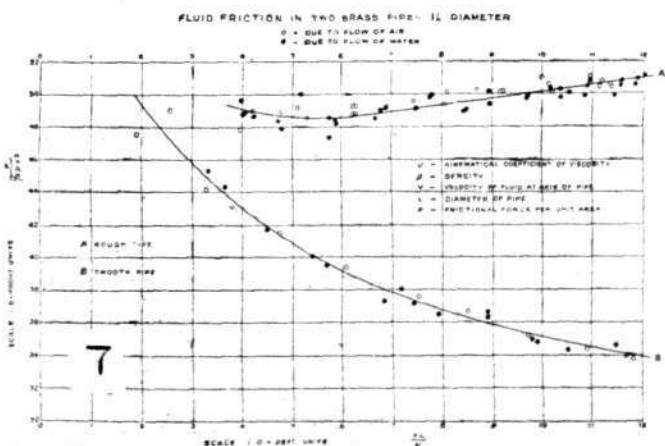
These rules are not new; engineers have acted on similar rules for a long time. Railway bridges of short span in which the stresses are mainly due to the train follow the aeroplane law. Long span bridges, like the Forth Bridge, in which the stresses are mainly due to the weight of the bridge girders and only in a minor degree to the train, follow the dirigible law, and it is recognised that there is an upper limit to the size of cantilever bridges, just as there must be an upper limit to the size of dirigibles.

Interesting as these applications are, they are not so important as the application of the principles of similitude to the motion of fluids,

RESISTANCE OF SMOOTH WIRES



RESISTANCE OF SMOOTH WIRES



because we have more complete theories available. Theories of hydrodynamics and aerodynamics are, however, very incomplete, and in naval architecture are rejected in favour of experiments on models. The particular problem is here, to find the resistance due to waves. Obviously, the waves depend on the earth's attraction, on the length of the model, its velocity, and the density of the fluid, and, so far as is known, on nothing else to any appreciable extent. The most general expression for resistance which contains all these

quantities and has the right dimensions is: Resistance = $\rho v^2 l^2 f\left(\frac{v}{\sqrt{g}}.$

Now f is a general unknown function, and at first sight it might appear to be impossible to make any use of the equation. A little analysis, however, shows how to avoid the difficulty, if only we are in a position to test a model of the ship. On the model earth g is constant, and if we make v^2/l have the same value for the model and ship, then $f\left(\frac{v}{\sqrt{g}}\right)$ has the same value; this is just the statement

of Froude's law of corresponding speeds. Now go further. We have used g as being the earth value for both model and ship. Suppose that the ship was for use on Mars and the model test was to be made on the earth, then the equation tells us that, since the attraction on Mars is less than that on the earth, the model must be towed faster in a given proportion. The reason for this extension of Froude's law is easy to see—since the earth attracts the water more strongly than Mars, it requires a greater disturbing force, and therefore greater speed, on the earth to create waves as big as those on Mars at the lower speed.

It has been known for a long time that frictional resistances do not follow Froude's law, and these forces are calculated separately. Suppose, however, that we are deeply submerged, then the surface does not matter, and we are left entirely with friction. What is the law in this case?

Experimental evidence now says, the resistance depends on the speed, the length of the model, the velocity and on the density and viscosity of the fluid. As before we find Resistance = $\rho v^2 l^2 f\left(\frac{v}{\nu}\right)$ is the only possible relationship between the above quantities which has the correct dimensions. ν is the mathematical coefficient of viscosity. The models will now produce similar disturbances in the fluid if $\frac{v}{\nu}$ is constant.

This might be called the law of corresponding speeds for fluid friction, and was first stated by Osborne Reynolds. It differs from Froude's law of corresponding speeds in one particularly important respect. If we take two models of different sizes, the friction law says that the velocity past the bigger of the two must be the smaller, whilst Froude's law says exactly the opposite.

Turning now to an experiment in which the earth's attraction, and therefore, presumably, Froude's law, doesn't matter, we can see (Fig. 2) in a striking way how the mathematical conclusions are borne out in fact. The motion of the water at the back of the

square plate inclined to a current of water is rendered visible by coating it with Nestlé's milk, and the photograph shows a continuous cork-screw sheath in the wake of the plate.

Imagine the speed to be gradually raised. For some time nothing remarkable happens, but eventually the flow changes its character to that represented in Fig. 3. Instead of a continuous spiral streak, the eddies now come off in definite loops, and there is no resemblance between the new and the old flows.

Imagine the small plate now to be removed and one twice its size substituted, and the experiment again repeated to find the velocity at which the flow changes. This has been done at the N.P.L., and it is shown that as nearly as it can be measured the change occurs in accordance with the friction law, i.e., doubling the size of the plate and halving the velocity always produces the same type of flow. This observation definitely proves that these eddies are produced by friction, and do not obey Froude's law as they are often supposed to do.

Now carry the experiment further, and change the fluid from water to air. A channel was made to take a model twice as big as that in the water channel, and the flow was made visible by smoke. Exactly the same changes were observed (Figs. 4 and 5) but the speed at which the flow changed was very much higher in the air than in the water. The mathematics says between six and seven times. We have not yet been able to do the experiment so accurately as to get a better number than that deduced from the laws of similitude.

I will conclude by referring to the two other experimental illustrations of the friction law of corresponding speeds. One refers to skin friction and has a bearing on the calculation of the resistance of dirigibles and aeroplane bodies, and the other refers to the resistance of stay wires. In each case the same results have been plotted in two ways, one of which compares the observations at the same speed and the other at corresponding speeds. The simplicity of the latter is strikingly illustrated by the difference in the curves.

For the pipes we see that the curves have no apparent connection (Fig. 6) when plotted at the same speed for air and water flowing through the same pipe. At corresponding speeds (Fig. 7) they could not be separated without the help of distinguishing points.

For wires the lines at the same speed basis (Fig. 8) have different inclinations and do not always pass through the origin. On a corresponding speed basis (Fig. 9), however, all the observations fall on a single curve without exception. In either case we could use the corresponding speed curves for all sorts of diameters, all sorts of speeds, and all sorts of fluids. The question which we set ourselves to answer at the beginning of this paper is solved when we know any one of these curves from the model to the full scale machine. To do this is a somewhat difficult task in some cases, and all accurate full scale experiments will be useful in order to establish model testing in a firm and unshakeable position. Until then it appears to be impossible to do anything better than to make predictions from model tests, using such discretion as may be suggested by experience on actual flying machines.

FLYING AT HENDON.

It was not so very long ago that the writer would look out of his window at some poplar trees to ascertain whether or not there would be any flying at Hendon, but now it seems that these trees can bend nearly double and still someone or other is almost sure to go up at the aerodrome. Such was the case last Saturday. The wind was blowing at between 30 and 50 miles per hour during the afternoon, yet in spite of this Pierre Verrier had the 70 h.p. Maurice Farman biplane brought out and put up a brilliant display. Further interest is attached to this flight in that a passenger, in the person of E. "Vitry"—none the worse for his nasty spill at Farnborough recently—was carried. Two circuits of the aerodrome were made, the biplane making but little headway when going against the wind. Some anxiety was felt, when it came to making a landing, for this is admittedly the trickiest part of a flight. The machine, however, was brought to rest with perfect safety, but no more flights were attempted that day. Sunday, the next day, was, perhaps, a little better as regards the wind, although rather more gusty. Several pilots went up, therefore, including one of some note—M. Chevillard, the chief instructor of the Henry Farman School at Etampes. This pilot made several flights in the 80-h.p. Henry Farman biplane, executing some astonishing banked turns and dives. We can promise those of our readers who go to the Easter meetings some flying worth seeing, for M. Chevillard has decided to take part in the races. Louis Noel also went up several times on the same machine, and the Maurice Farman biplane was again out, piloted by P. Verrier. M. Marty, who flew the 80-h.p. Gnome-Caudron biplane, recently acquired by the Admiralty, over from France, with Mr. A. Ramsay as passenger, was out testing the same machine.

Last, but by no means least, mention must be made of Marcus D. Manton's flying on the old 50-h.p. Grahame-White school 'bus. He handled this biplane with great skill, for a machine of this type and power has little or no chance in a wind like that blowing on Sunday—it was, in fact, to our way of thinking, rather risky for the machine to be out at all.

EASTER MONDAY AT BROOKLANDS.

THE following are the entries received for the Aeroplane Handicap, which will be held at Brooklands on Easter Monday. The course will be an out-and-home cross-country one of about ten miles. First prize will be Fifty Guineas, presented by the British Petroleum Co.; second prize of £25; and a third prize of £10. The event is timed to start at 5.20 p.m. :—

Entrant.	Pilot.	Engine. h.p.	Machine.
H. Spencer ...	H. Spencer ...	50 Gnome	Spencer B.
T.O. M. Sopwith	H. G. Hawker	40 A.B.C.	Sopwith B.
(Burgess-Wright type.)			
Maurice Ducrocq	J. Alcock ...	50 Gnome	H. Farman B.
C. H. Gresswell	Pierre Verrier ...	70 Renault	M. Farman B.
(Aircraft Co.)			
Do. ...	M. I. Chevillard	80 Gnome	H. Farman B.
R.H. Barnwell...	A. Knight ...	50 Gnome	Farman type B.
R.H. Barnwell...	R. H. Barnwell...	60 R.E.P.	Vickers M.
F. W. Merriam...	F. W. Merriam	50 Gnome	Bristol B.

B. = biplane. M. = monoplane.

SOME AUTOMATIC STABILITY AEROPLANE PATENTS.

By ERNEST M. GREEN.*

WHILE the question of the stability of aeroplanes, as obtained by the shape and curvature of the wing surfaces, apart from auxiliary attachments such as pendulum devices, &c., is so much before the public, it might be of service to consider a few of the many patents obtained in this country relating to the subject.

The success of the Dunne, Handley Page, Etrich and Lohner aeroplanes, to mention just a few names of the type of machine, is certain to produce a host of others working on the same or similar lines, and designed to produce the same results.

When examining the various patents, it must be borne in mind that the force of gravity must in some way or other be used to ensure the correct attitude of the aeroplane with relation to the ground. Any device that claims to keep an aeroplane in a fixed attitude without reference to gravity is foredoomed to failure. Patentees of the various devices such as are described in this article are in many cases very loose in expounding their theories, and in certain cases appear to consider that with suitable shaped wings the aeroplane will always remain in a horizontal position irrespective of the action of wind gusts. Although certain shapes of wing surfaces are undoubtedly much less influenced by wind disturbances than others, it is quite impossible to believe that conditions will not arise when horizontality will not be maintained, and unless the force of gravity or the control of the pilot is called in to provide a restoring couple, the aeroplane must lose its equilibrium.

In practically no instance can the inventor's theory be put into a form concise enough to include in this short article, and it is more than probable that the theory as set out in the specification is far from being a complete statement of the case, or is even adequate to explain the undoubted success of certain of the inventions. In the descriptions of the various inventions, the theory is not given, but those who may be interested are advised to refer to a copy of the specification.

It is somewhat curious to note that patents standing in the names of well-known experimenters in the quest of automatic stability are not so numerous as one might fancy, and this will to a certain extent explain the reason why no patents covering several well-known machines are mentioned in this article, which sets out to discuss the patents on automatic stability machines which have actually flown.

One of the earliest experimenters was Weiss, his patent, No. 17150/08, showing a tailless machine having more or less crescent-shaped wings, the side portions being almost flat, and the rear portions quite flexible. The curvature of the plane in longitudinal section decreases from the centre to the sides; horizontal planes are used for steering.

As a model glider and as a man-carrying glider, the Weiss machine proved a success, having a large amount of inherent stability, but as a power-driven machine it did not do so well, perhaps owing to difficulties of construction. It is to be noted that in the later experiments a tail was fitted.

Another pioneer, Dunne, has several patents on the subject. The main patent appears to be No. 8188/09. This shows the typical Dunne V-shaped wings, the angle of incidence decreasing from the centre to the tips, and in some cases forming a negative angle. Horizontal flaps are used for steering. In his patent specification No. 11021/09, Dunne describes an improvement on his previous patent. In this case the invention is applicable to biplanes and multiplanes, the variation of incidence of the upper plane being greater than that of the lower plane, so that the tips of the upper plane are inclined forwards in relation to those of the lower plane.

In Dunne's specification No. 26441/09, an improvement on his two prior specifications, the V is described as not being so pronounced, an additional plane surface being provided, preferably situated in front of the main planes. An earlier patent of Dunne, No. 2808/08, is also of interest.

Etrich's patent specification No. 14204/10 (dated under convention,

* F. M. Rogers and Co., Patent Agents, 21, Finsbury Pavement, E.C.

ROYAL FLYING CORPS.

THE following appointments were announced in the *London Gazette* of the 14th inst. :—

Special Reserve of Officers.—R.F.C.—Military Wing.—The undermentioned to be second lieutenants (on probation). Dated March 15, 1913: Hon. Capt. Gilbert Braithwaite Rickards and Hugh Clarence Fuller.

The following appointments were announced by the Admiralty on the 17th inst. :—

Lieuts. R. A. Wilson, W. R. Crocker, and W. C. Hicks to the "Actæon," additional, for training in airship work.

September, 1909) describes an aeroplane in which the main planes are provided with rearwardly projecting extensions. The central portion of the main planes has a substantially uniform curvature in the direction of flight; the extensions have a negative angle and are flexible, being used for warp control.

An interesting patent is that of Bragg-Smith, No. 27812/08, which shows a biplane of the "Canard" type in which lateral stability is obtained by curving up the lower plane at its outer ends to or towards the upper plane, or the same result may be obtained by employing a series of plane sections. The upper plane is set at a dihedral angle.

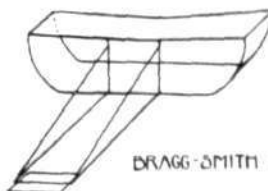
As a model this invention has had a large degree of success, and it is to be hoped that a full-sized power-driven machine will be constructed in the near future in order more fully to test the merits of the invention.



DUNNE. 8188/09.



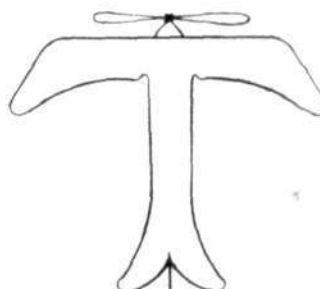
WEISS. 17150/08.



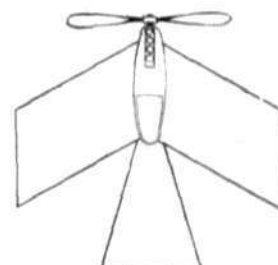
BRAGG-SMITH. 27812/08.



SLOAN. 7303/11.



ETRICH. 14204/10.



FOKKER. 596/13.

Somewhat similar to Bragg Smith's patent is that of Sloan of "Bicurve" fame, No. 7303/11 (dated under convention, March, 1910). In this, the upper and lower planes converge at their outer ends and are curved laterally. At the outer ends openings are provided so as to allow for the escape of air imprisoned between the two planes.

In Fokker's specification No. 596/13, just recently published, stability is obtained by inclining the planes upwards as well as in a rearward direction, and distributing the weight so that the centre of gravity is disposed above the centre line of the vertical force. No provision is made for warping or for balancing flaps.

It is to be noted that the fin effects of the body and tail have been cut down to a minimum in order to make the rudder act very quickly.

The above-mentioned patents must only be considered as a few of the many patents on the subject, although it is hoped that the more important ones are included.

Flying at Montrose.

SOME fine work was carried out by the squadron of the R.F.C. at Montrose on Monday. The conditions appeared good in the morning, and Capt. Becke went up on a BE 2 for a cross-country trip. He had not, however, been long in the air before a blizzard swept over the district, and it was only with difficulty that he was able to effect a landing. Capt. Longcroft on another BE and Lieut. Waldron on a M. Farman also had exciting times. They had been up for three-quarters of an hour when they were caught in a windstorm, and Capt. Longcroft came down about two miles north of the aerodrome while Lieut. Waldron landed at Cuthlie, three miles west of Arbroath.

"NATURE'S AEROPLANES."

By E. F. ANDREWS.

At Daytona Beach, Fla., during January, February, and March, 1911, with the self-proffered and very able assistance of Mr. R. E. Acre, the writer attempted to make some additions to the present meagre store of data upon the flight of soaring birds, and the details of their physical construction.

The first part of our experiments consisted of securing specimens of large soaring birds from which to obtain our data and information. This part of the experiments was accomplished by the aid of a gun, and could hardly be regarded as work by even the poorest scientist.

The stream-line form of the body of these birds we found to be comparatively bad in front. It is evident that here nature has sacrificed perfect stream-line with other and more necessary objects in view. Even so, the air cutting qualities of a bird's head are unquestionably far superior to those of a Gnome motor. The cross-section of the body of every bird examined was nearly a perfect circle at its largest point, which is located under the front edge of the wing. From this point backwards the body tapers very rapidly in a vertical direction, but very little horizontally; its cross-section at the rear edge of the wing being that of a very flat ellipse with its major axis running from port to starboard. Here the fleshy part of the body ends. But the stream-line form continues on past this point and blends imperceptibly into the tail. The tip of this organ is usually about three-quarters of the chord from the rear edge of the wing, and during ordinary flight it is folded so as to be very little wider at this point than at its juncture with the body. Thus the tail and the body form one unit, of very good stream-line form, which reminds one very strongly of the flat fantail Blériots. The wings are attached with their tips on a level with the top of the body. At their point of attachment they are blended into the body by a multitude of small downy feathers, in such a way as to leave no air-pockets to set up unnecessary head resistance. The designers of aeroplanes would do well to copy the bird, at least in this respect.

Although considerable attention was paid to general details of the birds we examined, by far the greater part of our time was spent in securing the wing outline, and the cross-section of the wing at regular intervals from centre to tip.

The process of securing this data consisted of first laying the bird on its back on a large sheet of paper, and tracing the outline of one wing and a half of the body with a lead pencil. This done, a wing was cut off close to the body, and nailed securely to several small blocks, which were in turn nailed to the bottom of a large box. We took great pains to always nail down the wing as nearly as possible in its normal soaring position. When all was ready, melted paraffin was poured into the box until the wing was covered. After hardening the block of paraffin containing the wing, it was prized out of the box, and sawn into pieces of equal width. By running a flame over the face of these, and laying a piece of tracing paper over it while it was still hot, a very accurate cross-section could be traced off, reproductions of which are herein enclosed.

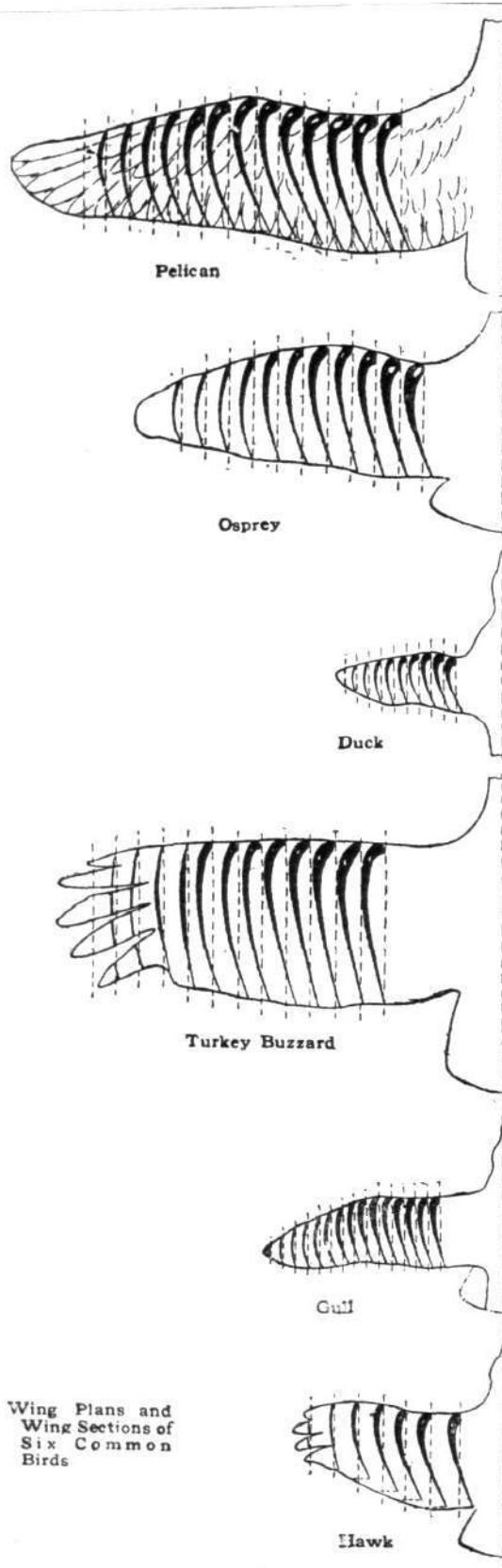
Three features seem to be characteristic of every wing examined. First, the great thickness of the wing near the front edge; second, its rather deep curve; and finally, the steady decrease of both thickness and curvature from the wing root towards its tip.

The thickening of the front edge of the wing near the body is undoubtedly a structural necessity, as the wing has no diagonal bracing, the strain increases as the point of attachment to the body is neared. The rapidity with which this thickness decreases from the wing root outward would seem to indicate that it was undesirable aerodynamically. It is the opinion of the writer, however, that the ideal form of wing should be just thick enough at all points to be made of proper stream-line form. For gliding flight or in an aeroplane I can see no reason why a wing should be thicker at the base than at the tip. The thinning of the bird's wing, however, is due to the necessity of flexibility in the wing tip during flapping flight, and for obvious structural reason.

The wing curves secured showed the maximum curvature to be well towards the front edge, and rather deep in all cases. It was our opinion, however, that this was not a permanent condition. A bird's wing is constructed in such a manner as to make the camber variable throughout a wide range. The bird changes this at will, according to the different conditions under which it flies. The wing sections here shown were, of course, taken when the wing was in a limp condition, and without the pressure on them they receive during flight. Due partly to this and partly to the voluntary flattening which is accomplished by an upward rotation of the front edge of the wing around the large wing-bone, the wing-curve in flight is probably much flattened and changed in shape.

The decrease of curvature from the centre of the wing towards the tip was very noticeable. A slight flattening of the wing at the extreme tip is probably good aerodynamically, on account of the side-slip of the air off the wing end, but the bird possesses it to an

extent not warranted by this cause. A logical explanation of this decrease in curve was made by Mr. Wilbur Wright, in the presence of the writer. He attributes it to the fact that the tip of a bird's



Wing Plans and
Wing Sections of
Six Common
Birds

wing must act as a propeller during a flapping flight, and for this the deeply curved section is not well adapted.

Now a word in regard to the flight of soaring birds.

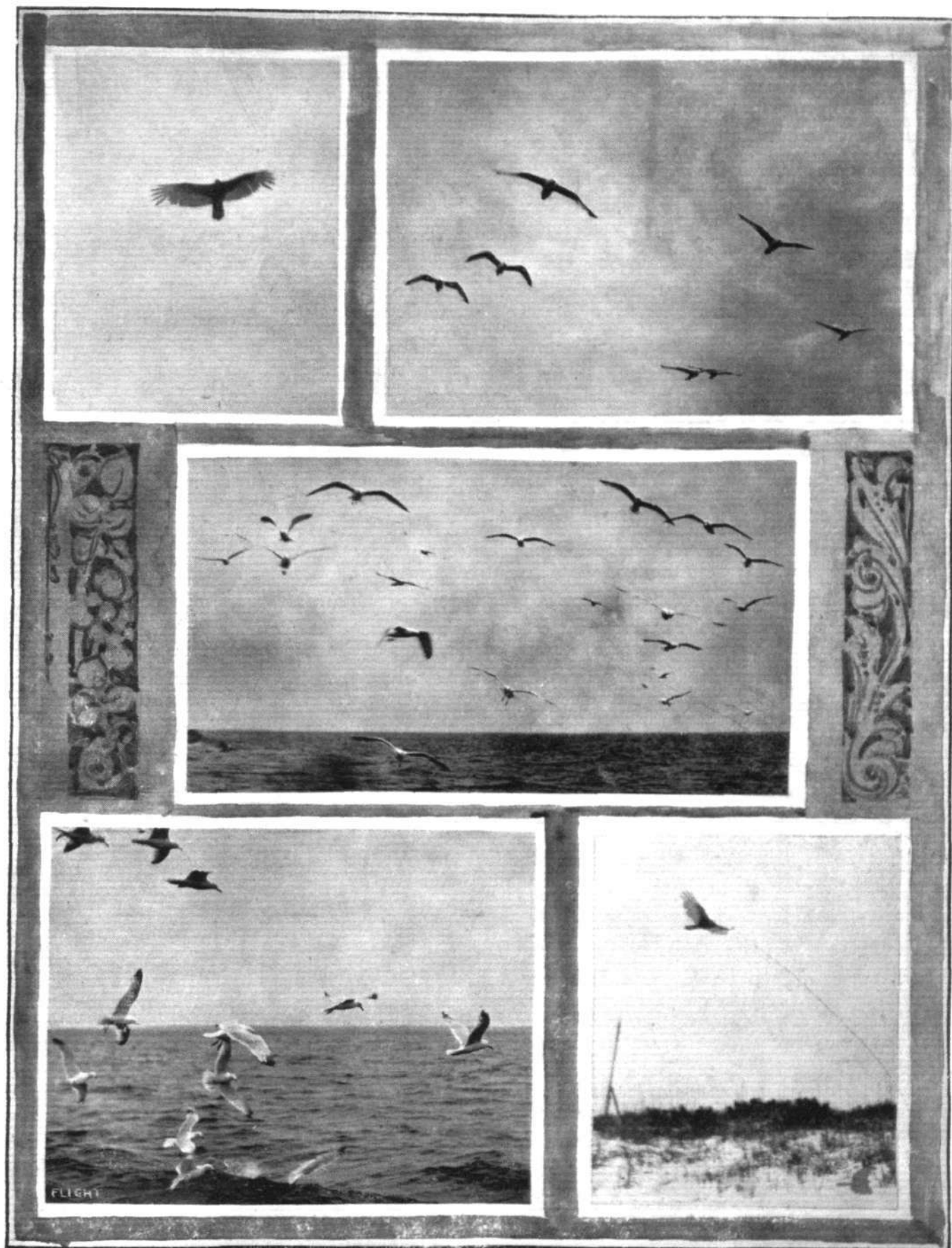
This has always proved as interesting to me as it is mysterious.

MARCH 22, 1913.

FLIGHT

The turkey buzzard who will, before one's very eyes, calmly glide upward on motionless wings as if such a thing as gravity never existed, has to me been a source of perpetual wonderment. Many

times, after watching them wheel in ever highering circles only a few feet above my head, have I tried every means at my disposal to detect the rising current that supported them. I have liberated



"Nature's Aeroplanes," by E. F. Andrews.

thistle down and the lightest feathers, with the bird soaring 25 ft. overhead, and to my surprise these indicators always fell to the ground.

Not satisfied with this, I flew up a kite with a bag of feathers attached in such a way that a jerk on the kite string would liberate a crowd of them. Sometimes one of these would be caught in a rising wave of air which would elevate it several feet, but after travelling a short distance it would encounter a downward wave that would lower it again, and in time they seemed always to come to earth.

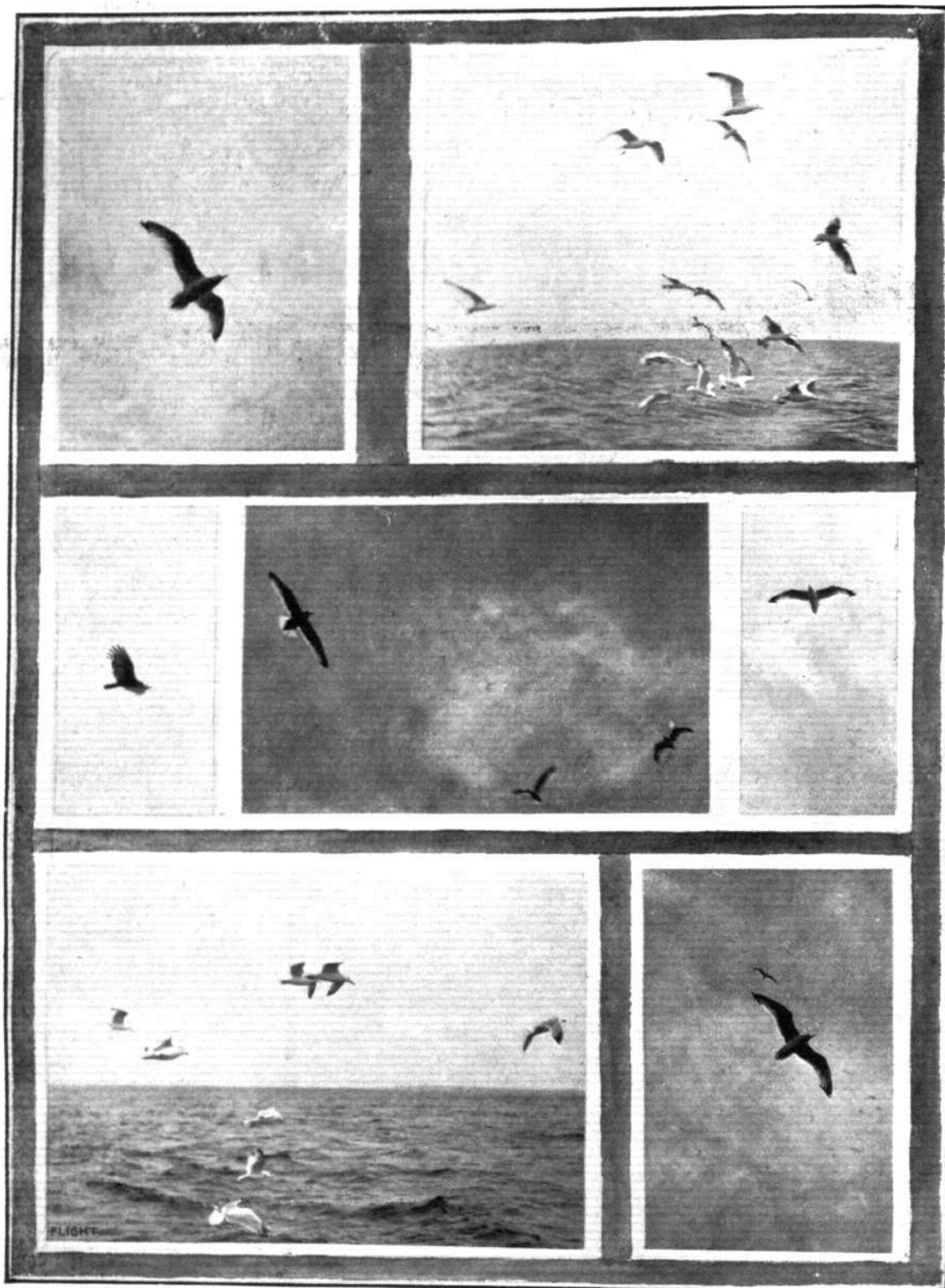
These experiments, of course, do not prove that rising air-currents do not exist. They do prove, however, that soaring flights can be accomplished when no rising air currents exist of sufficient velocity to support a feather.

It is certainly hard to draw any conclusions from watching the performances of soaring birds. They seem to do things that upset all theories. I have seen them sailing when the smoke from a near-by chimney had an upward trend, then remain aloft just as easily when the smoke from the same chimney blew out straight or had even a slightly downward motion.

Three factors, however, seem to facilitate soaring, namely, sun, wind, and heat. On days that combine these three conditions, soaring seems to be

at its best. If the weather is sufficiently favourable birds that under ordinary circumstances are flapping flyers can soar very readily. I have often seen whole flocks of common crows soar upward on motionless wing as if suddenly endowed with the power of the condor.

Personally I think that the phenomena of soaring flight is due to the fact that soaring birds have large supporting surfaces comparatively light weight and very low head resistance, in consequence of which their gliding angle is very flat. This makes it possible for them to derive sufficient power for sustentation from very slight rising air currents, from air waves, and from the constant fluctuation of wind velocity, which their perfect mechanism and great skill enables them to take advantage of. Still, at times one



"Nature's Aeroplanes," by E. F. Andrews.

sees performances by these masters of air which, by any of the known laws, are certainly hard to explain.

	Area. Sq. ft.	Span. Ft. Ins.	Cord. Ins.	Weight. Lbs.
Pelican ...	4'66	6 8	11	7'25
Buzzard ...	4'74	6 0	13	4
Osprey ...	3	5 1	10	3'25
Gull ...	1	3 3	5	'75
Duck* ...	'52	2 1½	4½	1'5
Hawk ...	1'10	2 11	7½	1'125

* Note the comparatively great weight carried by the duck, which is strictly a flapping flyer and a very poor glider.

ROYAL AERO CLUB DINNER.

THE annual dinner of the Royal Aero Club was held at the Royal Automobile Club last week under the chairmanship of Sir Chas. D. Rose, Bart., M.P. The guest of the evening was Col. Seely, M.P., Secretary of State for War, whose presence gave a peculiar interest to the occasion in view of the possibility of a momentous utterance from him on the subject of the aerial defence of the British Isles.

Many distinguished members and guests were present, among whom may be mentioned Mr. H. J. Tennant, M.P., Mr. H. T. Baker, M.P., Mr. W. Joynson-Hicks, M.P., Mr. Davison Dalziel, M.P., Maj.-Gen. R. M. Ruck, Brig.-Gen. D. Henderson, D.S.O., Capt. G. M. Paine, R.N., Col. H. C. L. Holden, Mr. T. Marlowe, Professor J. H. Biles, Professor A. K. Huntington, Mr. A. Mortimer Singer, Mr. Mervyn O'Gorman, Mr. J. W. Orde, Mr. C. F. Pollock, Sir John Shelley, Bt., the Hon. Lady Shelley, Col. J. E. Capper, Lieut.-Col. K. R. Campbell, Commander C. R. Samson, R.N., Major B. Baden-Powell, Major F. Lindsay Lloyd, Capt. J. Boyd-Carpenter, Capt. B. D. Corbet, Lieut. Lawrence, Messrs. E. C. Bucknall, S. F. Cody, F. K. McClean, Moore Brabazon, T. O. M. Sopwith, Holt Thomas, J. E. Hutton, F. R. Simms, Dr. W. J. S. Lockyer, Alec Ogilvie, F. Handley Page, Warwick J. Wright, Howard T. Wright, Stenson Cooke, H. A. Blackie, T. F. Woodfine, John Cates, G. Hamel, James Valentine, and Harold E. Perrin, secretary.

In proposing the toast of "The Club," the chairman made reference to the honour paid to the club by the King's gracious patronage, which was yet another expression of the interest shown by His Majesty in the legitimate aspirations and ambitions of his subjects.

Continuing, he said the club was now in a highly prosperous condition, the membership being over 1,400. It was hoped shortly that they would be able to acquire new premises for the adequate accommodation of their members. During the past year they had to deplore the loss of 14 members, whose deaths were caused by accidents whilst flying. Up to the present 446 certificates had been granted to aviators, and of this number 270 had been issued during the past year. No fewer than 230 aviators were on the active list of His Majesty's forces.

The Secretary of State for War's deep interest in the subject of aviation was a source of great satisfaction to them, and with the assurance of the public's support a fleet of aerial vessels adequate to the requirements of our national defences would, he hoped, in a reasonable time be an accomplished fact.

Col. Holden proposed the toast of "The Guests," and in response, Col. Seely said that on Wednesday next he contemplated making a statement in the House of Commons upon the progress made in the newest of arts and sciences. He could not anticipate that statement. It was to the flying members of the Club that Great Britain looked to enable her to keep in the forefront in aerial competition. He believed that the progress made, admitting that we started far behind other nations, was far greater than that in any other country in one year, and justified them in feeling sanguine as to the future. All the money that he (Col. Seely) and the First Lord of the Admiralty had asked for had been granted by the Chancellor of the Exchequer.

Confirming the figures given by the chairman of the number of aviators on the active list, Col. Seely went on to say, that although

they were not so great as he could wish, a large increase would take place in the near future.

It was difficult to set a standard in the matter of aviation. To take as a standard the number of guns and regiments we had would be wholly insufficient. They must aim at a higher standard than that. We had the skill and brains.

There were men in this club who in the science of aeronautics had taught the whole world technical details which might not otherwise have been known, and there were men who by their innate genius and fortitude had overcome seemingly insuperable difficulties, and had done so in a far greater measure than the men of foreign countries.

In the International Competition, the first prize went to a member of the club present that night, and had it been possible for the Government's scientific advisers to enter a machine for competition they might not only have shown the way to foreign countries, but also have run the winner very fine.

Col. Seely paid a eulogy to the members who had died through accidents, and said that they had died as truly in the service of their country as if they had fallen on the field of battle, in trying to conquer the secrets of the air which might yet prove a necessity to our imperial and national existence.

Victory would go to the most courageous race, and he believed we should not be found wanting in that essential quality. Fatal accidents had no effect whatever in diminishing the determination of the Royal Flying Corps to fly. The immediate future of aviation rested with the armies and navies of the various countries, to a greater extent than in its civilian application, and he believed that that would be the case for some time to come.

Paying a generous appreciation to the members of the Aero Club, to which His Majesty's forces owed so much, Col. Seely suggested that they should endeavour to secure greater safety for aeroplanes, for not only would that be of incalculable benefit to the Army and Navy but to the industry itself. It would not be all on the side of the aviator when the guns began to shoot, and he emphasised that this question of defending aeroplanes from the guns was of paramount importance.

In conclusion, he wished to publicly acknowledge the great services rendered to the Government by the club.

Mr. Joynson-Hicks also replied on behalf of the guests, and his speech came in the nature of an anti-climax. Judging from the enthusiasm aroused among the guests, his pointed remarks were greatly appreciated. Twice he was interrupted by prolonged applause. He described Col. Seely's speech as an excellent essay in "skating." He added that quite outside the realm of party politics, the position of this country in regard to military and naval aviation did not redound to the honour of Great Britain. He hoped the Secretary of State for War would be able to announce on Wednesday that within the next 12 months our aerial forces would be brought up to the level of Germany.

The British Empire Michelin Trophy No. 1, and cash prize of £500 was then formally presented to Mr. H. G. Hawker, in whose absence Mr. T. O. M. Sopwith made response; and the British Empire Michelin Trophy No. 2 and cash prize of £600 to Mr. S. F. Cody, who responded in a vigorous and characteristic speech.

An enjoyable musical programme concluded the occasion.

AIRSHIP NEWS.

A Long Cruise by "Beta."

BOTH the "Beta" and "Gamma" were cruising at Aldershot last week, and on the 12th the former made a record run of 8½ hours' continuous travelling to Folkestone and back. Afterwards a tour was made round Aldershot, and the next day the dirigible carried out some altitude tests.

The German Airship Manœuvres.

A START was made with the oft postponed airship manœuvres at Cologne on the 12th inst., when both the P II and the Z II were out for an hour. While the former was landing, a soldier approached too near one of the still revolving propellers, and received injuries to which he succumbed later.

A Zeppelin at Ghent.

IN connection with the International Exhibition at Ghent arrangements have been made for a regular service by a Zeppelin airship from Dusseldorf to Ghent during August, September and October. The fare for the journey of 130 miles has been fixed at £14.

Firing from Top of Zeppelins.

AT Friedrichshafen on Sunday some 500 rounds of ammuni-

tion were fired from a quick-firing gun mounted on the top of the rigid framework of the "Zeppelin IV."

A New German Dirigible.

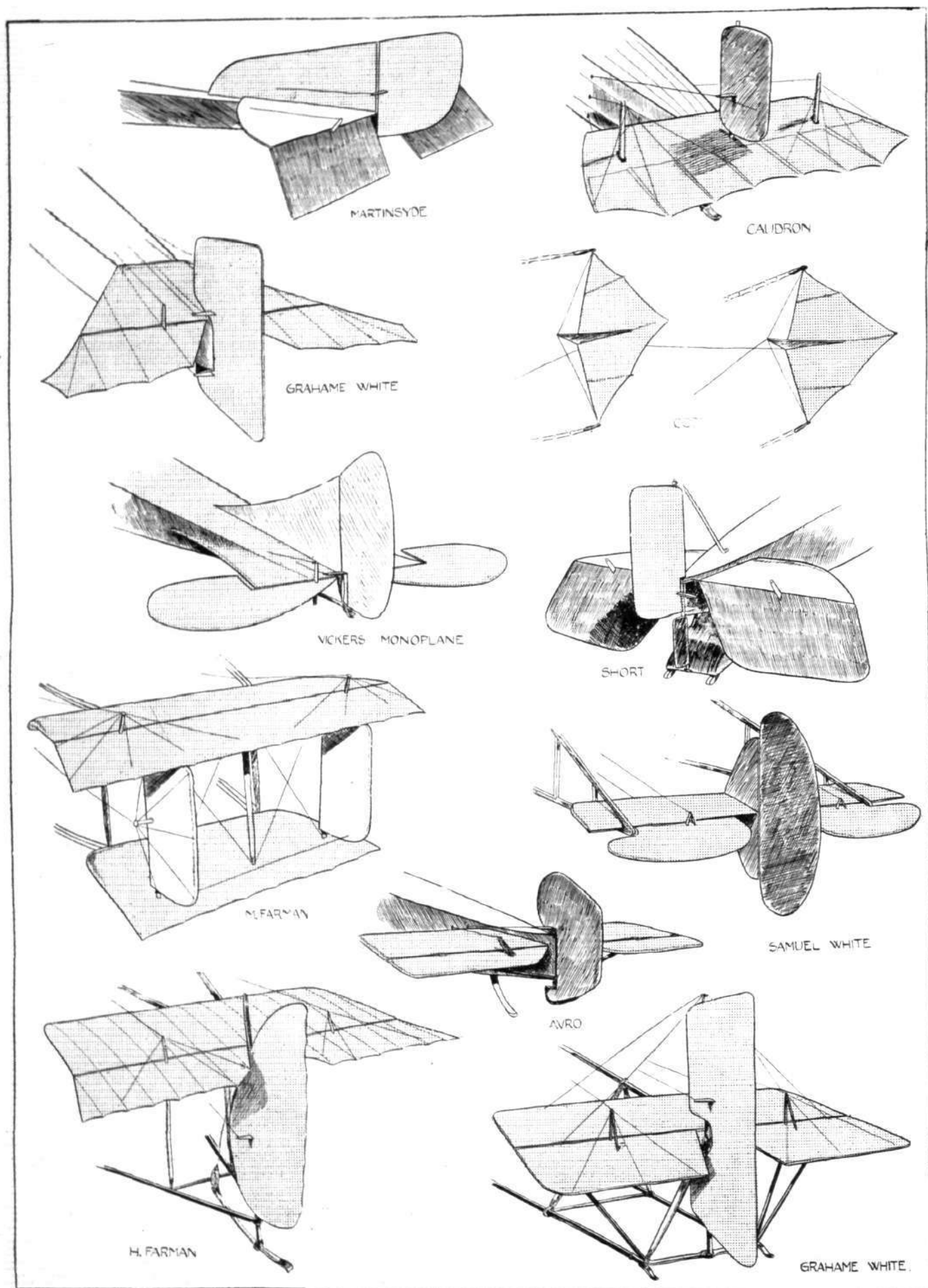
AT Dusseldorf, a new Vech dirigible of the semi-rigid type is being constructed. The envelope is 78 metres long, and the capacity 8,000 metres. The various parts of the airship are so designed as to be easily dismountable, and wherever possible the framework is made of steel. The car is 46 metres long and 1 metre wide, and weighs 1,640 kilograms. It carries two 4-cylinder motors of 125-h.p., each of which drives two wooden propellers of 4 metres diam.

A Trial by the "Fleurus."

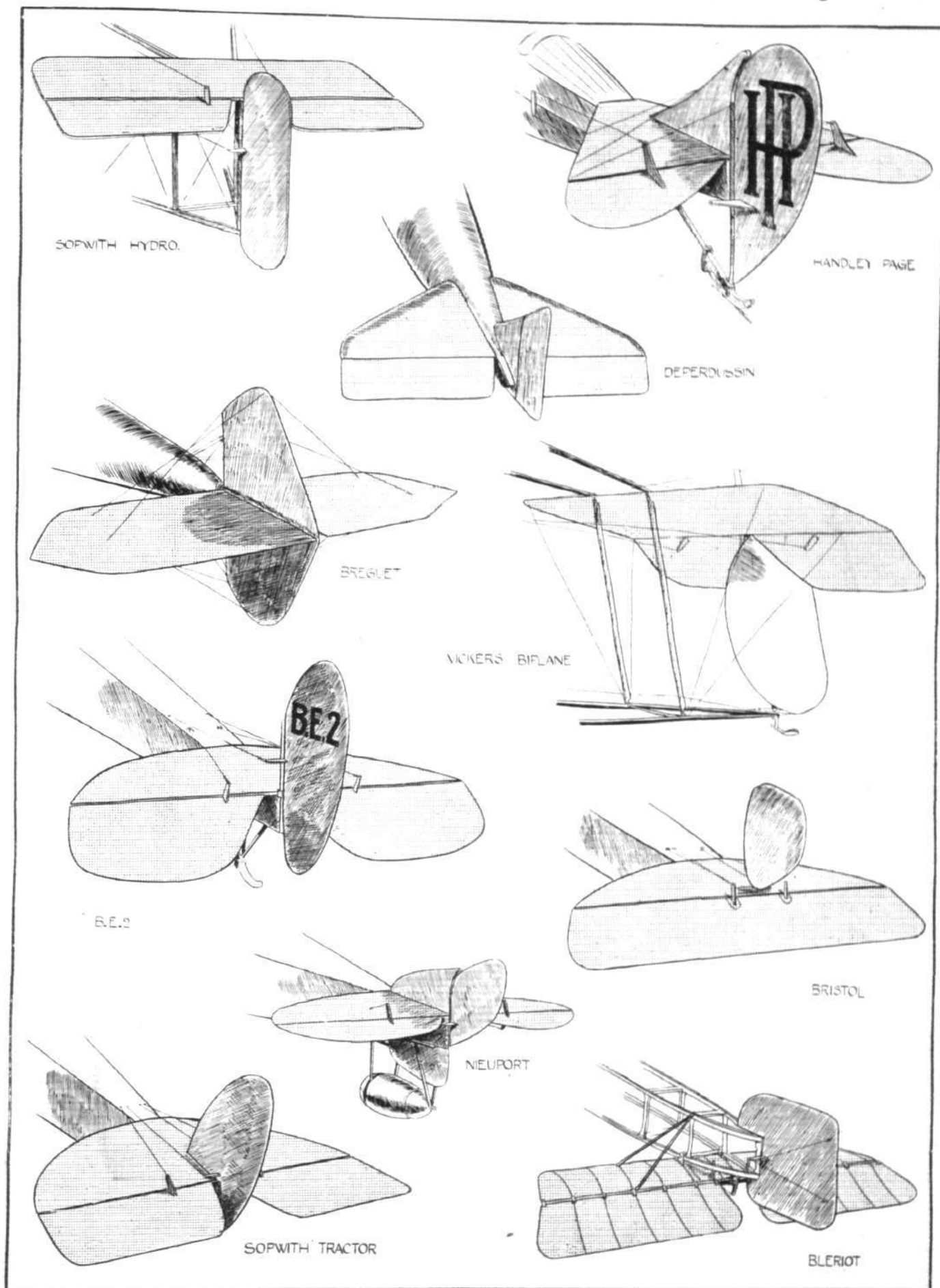
THE dirigible "Fleurus," built in the French Army factory, made a cruise on the 12th from St. Cyr to Issy.

New Astra Airship for Russia.

THE new dirigible built by the Astra firm for the Russian Government made her first ascent on the 11th, when with nine persons on board she cruised in the neighbourhood of Issy for twenty-five minutes.



A study in tails.



A study in tails.

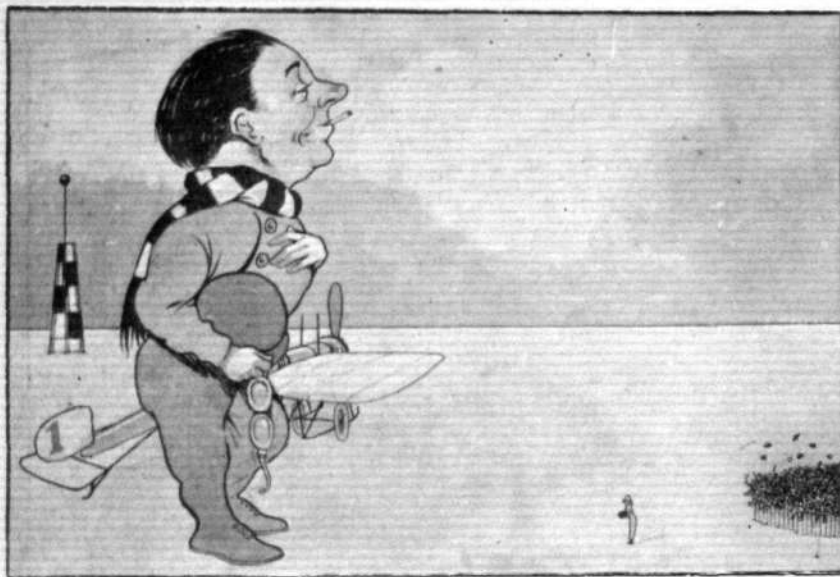
FROM THE BRITISH FLYING GROUNDS.

Brooklands Aerodrome.

Bristol School.—On Monday, last week, wind and rain prevailed until 5.30. Merriam then out for trial, afterwards giving tuition to Lieut. Picton Warlow for two circuits with landing practice. Darkness prevented further work.

Wind was blowing hard on Tuesday, and flying was not attempted.

On Wednesday, Merriam was first out, followed by Bendall on another machine, both flying round to wake up pupils. Lieut.



Reproduced from "The Austin Advocate."

The darling of the gods at a shilling).

Blatherwick was out later for two good solos, Lieut. Robertson Dobie doing a couple of good circuits and then describing several excellent figures of eight, landing well. This latter pupil is quite ready for his certificate. Merriam was with Lieut. Picton Warlow, Bendall taking Lieut. Morgan, giving pupils landing practice. Bendall was passenger to Lieut. Picton Warlow and Lieut. Morgan on straights. Lieut. Picton Warlow then went up alone and made four good straights. Merriam and Bendall finished up morning's work by making a solo each.

Wind was far too bad after breakfast for school work. Merriam and Bendall each made a test in the afternoon, finding conditions too bumpy. Later on Merriam was out and found improvement. Lieuts. Blatherwick and Robertson Dobie both out for solos, Lieut. Morgan having Bendall as passenger. Lieut. Picton Warlow also out, and made four really good straights.

Fog prevented an early start on Wednesday. However, it cleared about 10 o'clock, and Merriam was out for a test with Lieut. Blatherwick as passenger, Bendall following with Lieut. Robertson Dobie. Each of these pupils was then out for solos. Conditions became too bad later on, and school work had to be abandoned.

Gale was blowing all day Friday, and outdoor work was impossible.

On Saturday no improvement in weather, and work was resumed in the hangars.

Vickers School.—Wednesday last week, after breakfast, Barnwell on No. 5 mono, testing new type of engine counter. In the afternoon, Barnwell on biplane with Mr. Knight in passenger seat learning control of elevator.

Thursday, Barnwell on Farman during afternoon, but too bumpy for pupils.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—W. Birchenough out at 6 p.m., Tuesday last week, on No. 7 machine, doing straights under the superintendence of Instructor Louis Noel. T. Bayetto on Blériot monoplane, under the instruction of Mr. Cheeseman, at 6 p.m., doing straights and making fair progress.

W. Birchenough out Wednesday with Instructor Noel at 7.40 a.m. on No. 7, afterwards doing solo straights. J. D. North rolling on No. 7 with Instructor Manton in passenger seat. T. Bayetto out at 9.15 on No. 4 B monoplane, rolling under the superintendence of Mr. Cheeseman, the same pupils putting in good practice in the afternoon, when the weather was calm.

Thursday, T. Bayetto rolling on No. 2 B monoplane, under Instructor Manton, followed by R. H. Carr doing straights on No. 7. A. S. Power out at 10.45 doing straight flights on No. 7, also later

W. Birchenough on same machine. The weather in the afternoon still continuing good, pupils were able to have an excellent day's practice.

Friday and Saturday, weather too windy for school work.

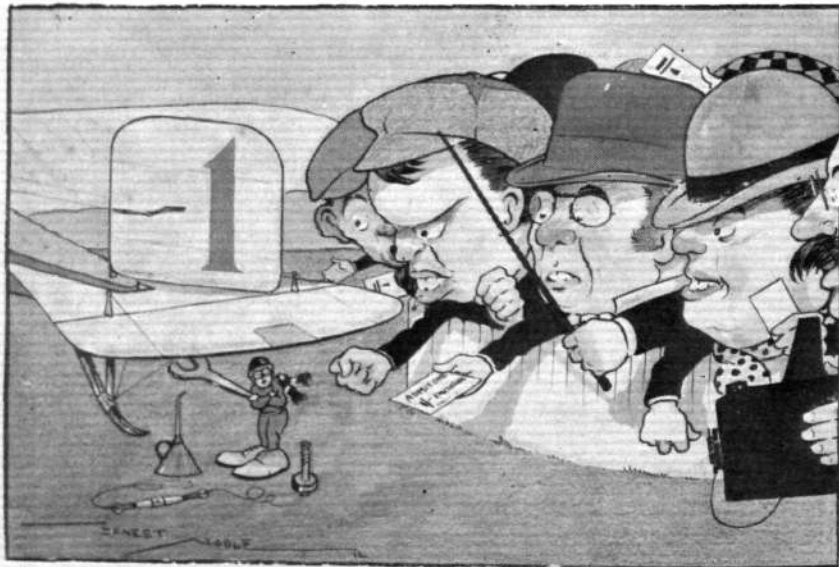
Thursday afternoon, the weather being particularly kind, some excellent flying was seen by the visitors to the aerodrome. Mr. Louis Noel flying the 80-h.p. Farman, Mr. Manton on the Grahame-White biplane, M. Desoutter on the Blériot monoplane, Mr. Cheeseman on No. 7 machine. Mr. P. Verrier was also flying the Farman biplane, M. Rene Caudron, also Mr. L. Turner on Caudron biplane, the whole making a splendid afternoon's exhibition.

Blériot School.—Quite a lot of work was managed to be done on Monday last week. In the morning Capt. G. Cox had his first les-on on the taxi, and made a very promising start; then Mr. Slack went up to try No. 4 before sending M. Gandillon aloft for figure eights, of which he accomplished two at 150 ft., the wind, however, being a trifle too strong for him to attempt his *brevet*. Meanwhile, Lieut. Loftus Bryan and MM. Desoutter and Clappen were doing very nice straights on No. 1, and Capt. Cox was doing good rolls on taxi 2.

The following day was windy, but on Wednesday Lieut. Loftus Bryan and Messrs. Clappen and Desoutter all did some nice straight flights on No. 1; the wind then rising, however, prevented further school work until the early evening, when Capt. Cox and Mr. de Villiers each did some rolling

practice on No. 2, and Messrs. Reilly and Desoutter were doing quite nice straight flights on No. 1 at about 12 feet.

Thursday again was another busy day, eight pupils taking advantage of a splendid opportunity for practice. Capt. Cox did excellently on No. 2 at rolling, and Mr. de Villiers was also

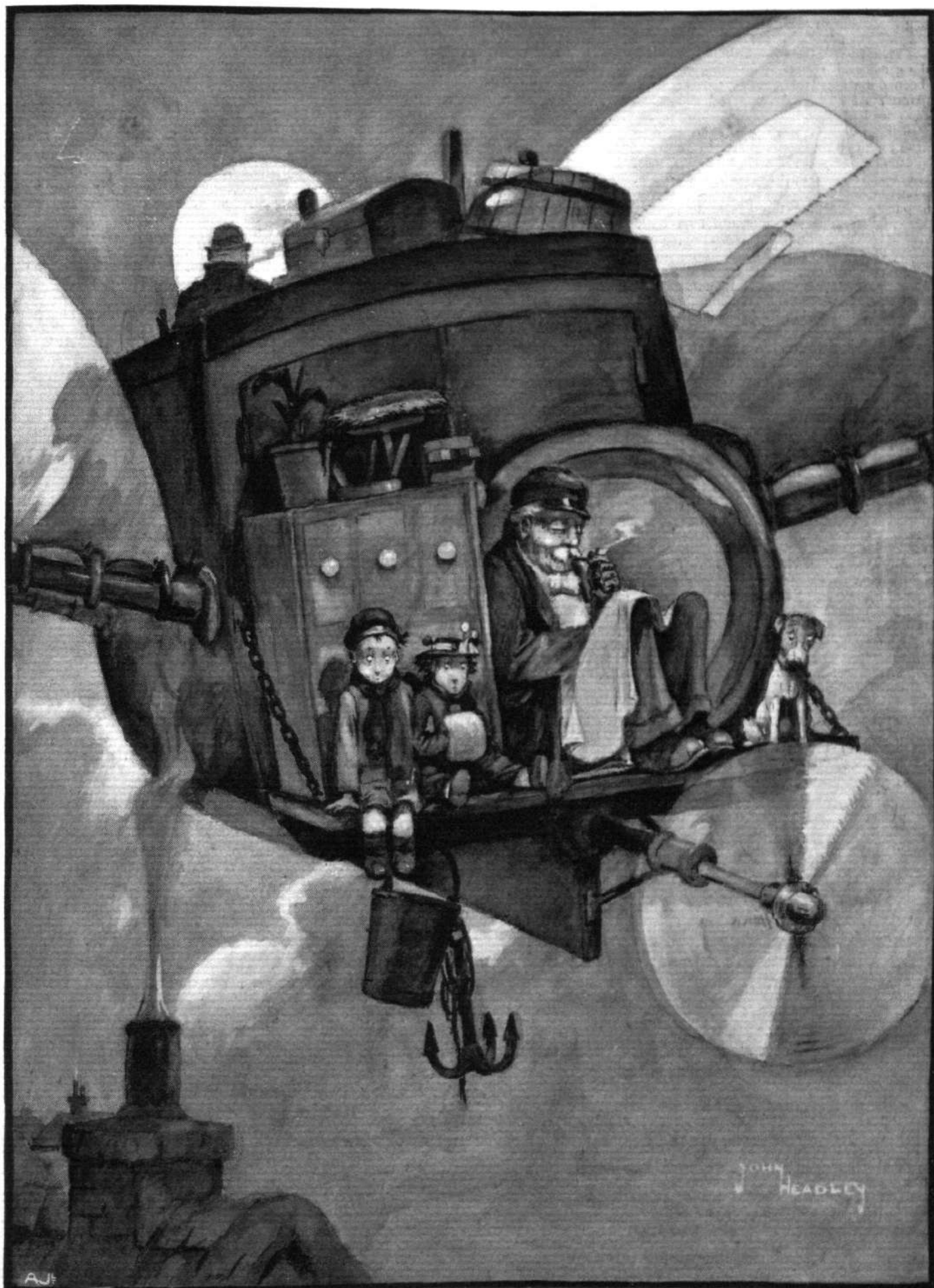


Reproduced from "The Austin Advocate."

The snarling of the gods (if he's unwilling).

similarly employed. Four pupils, i.e., Lieut. Loftus Bryan and Messrs. Reilly, Clappen and Desoutter, have all reached the end of the "straight-flight" stage, and are quite ready to start on circuits, of which, as a matter of fact, Lieut. Loftus Bryan has already done a brace. Mr. Williams was rolling on No. 2 and making good progress; and M. Gandillon went up for his *brevet* test, but, when

In 1950.



Flitting—by the light of the Easter moon.

at about 100 feet, was unluckily brought down owing to engine trouble, but made a beautiful landing *en vol plané* from that height. The two following days were too windy for school work. During the week Mr. Harold Lane joined the school for his superior brevet.

W. H. Ewen School.—Although the weather has not been ideal a considerable amount of flying practice and exhibition work has been done with the Caudron machines during the past week. On Monday, Mr. Stewart, under the instruction of M. Baumann, had an excellent morning's practice on the 28-h.p. Caudron, doing straight flights. Mr. L. W. F. Turner, after testing the 35-h.p. Caudron, handed the machine over to Messrs. Zubiaga and Warren, who each made several straight flights. M. Marty put up an excellent exhibition on the 60-h.p. Caudron. Rising rapidly to 3,000 ft., he was for several minutes lost to view in the clouds. He then put the machine through some spectacular right and left banking, finishing up with a beautiful spiral *vol plané*. Mr. Turner was out later on the 60-h.p. Caudron doing some good flying.

On Wednesday, the pupils were out under the instruction of Mr. L. W. F. Turner, who, after a test flight on the 35-h.p. Caudron, handed the machine over to Lieut. Osborne and Messrs. Torr and Stewart, who all put in a splendid morning's work in straight flights. After lunch, the above pupils, along with Messrs. McGregor and Zubiaga, were out flying again, greatly adding to their experience. M. Marty, during the afternoon, arrived with a passenger on the 80-h.p. Gnome-Caudron, having flown the machine from Paris to deliver to the Admiralty. Later, M. Rene Caudron made a number of excellent solo and passenger flights on the 80-h.p. Caudron, by way of showing the flying points of the higher-powered Caudrons.

During the afternoon M. Marty, accompanied by Lieut. Berne, R.N., went up on the 70-h.p. Caudron to put the machine through the Admiralty tests. Rising rapidly they were soon lost to view in the fog and clouds, they themselves soon losing sight of the ground. They ultimately came down at North Finchley, making a good landing. The machine was flown over the following morning by Marty. A new pupil, Mr. W. Pendlebury, joined the school.

On Thursday, a glorious day's practice was put in. All the pupils were out under the instruction of Mr. L. W. F. Turner and M. Baumann. Mr. Turner, after a test flight on the 35-h.p. Caudron, handed the machine over to Lieut. Osborne and Messrs. Torr, Stewart and Warren, who all made several capital straight flights. M. Baumann, who put up a flight on the same machine later, had an experience at about 150 ft., when he got into a bad remous, and banked almost vertically. To everyone's surprise the machine rolled back comfortably, and the pilot continued his flight. The pupils were also busy on the 28-h.p.

Caudron under the instruction of M. Baumann, Messrs. Stewart, Zubiaga and McGregor getting in some fine straight flying. After lunch all the pupils were again out getting in further good practice. Mr. Lewis W. F. Turner was also out on the 60-h.p. Caudron doing some pretty exhibition flying. During the morning M. Rene Caudron, accompanied by Lieut. Berne, R.N., flew the 70-h.p. Caudron through the height tests for the Admiralty. Rising rapidly, he was soon lost to view in the clouds and mist, but with the true homing instinct, he soon found his way back to the aerodrome, landing with a perfect glide from 3,200 ft. Immediately after, M. Caudron and Lieut. Spencer Grey were out on the 80-h.p. Caudron, doing some attractive exhibitions. Later, M. Caudron put the same machine through her climbing tests, taking with him Lieut. Berne. Rising rapidly to 3,400 ft. in 12 mins., he descended to 600 ft., putting the machine through some pretty flying tests. M. Marty, accompanied by Lieut. Osborne, R.N., as observer, then put the machine through the hour's test, which he accomplished with perfect ease, pretty and effective right and left banking being done.

On Sunday there was no school work on account of the very boisterous weather, but Marty was out on the 70-h.p. Gnome-Caudron, giving some splendid exhibitions of right-hand banking. Later, he was again up with a passenger on the same machine, and in both flights the spectators were impressed by the absolute steadiness of the machine in a gusty wind.

Salisbury Plain.

Bristol School.—Constant wind and rain. Flying impossible all day Monday last week. Schools closed on Tuesday. Funeral of the late Mr. Geoffrey England.

On Wednesday Pixton out first thing for couple of trials in a biplane, Mr. Tower on his return ascending for a solo, making a very good all-round flight. Jullerot was out for a trial on a 50-h.p. tandem monoplane, and also of the side-by-side monoplane. Mr. Woldfrain Paschen (who gained his certificate out in Germany on a "Bristol") made an excellent flight on a side-by-side monoplane. Pixton took Lieuts. Griffiths and Broadrib for biplane tuition.

Pixton was first up in the afternoon, followed later by Jullerot, the latter being on a 50-h.p. tandem monoplane. Pixton then gave tuition to Lieuts. Read, Griffiths and Broadrib in biplane, taking each pupil for long trips round Fargo. Jullerot made a test of one of the side-by-side monoplanes, after which Lieut. Negrescu made a good flight on this machine. Jullerot then took Capt. Landon for tuition, this pupil then making two very good solos. Pixton was busily occupied in giving tuition to Lieuts. Griffiths and Broadrib. Jullerot tested a tandem and a side-by-side monoplane, afterwards sending Lieut. Parvelescu in the latter for a solo.

Darkness prevented further work.

Pixton was out early for customary trial on Thursday, Mr. Tower afterwards making quite a good biplane solo. Lieuts. Broadrib and Griffiths were each taken by Pixton, the pupils taking charge of the hand control and having three trips each. Two excellent solos were carried out by Mr. Paschen on a 50-h.p., landing very neatly. Pixton meanwhile giving a passenger flight to Lieut. Parvelescu, but rising wind caused abandonment of outside work.

Snow and terrific wind rendered flying impossible all day Saturday. Work was resumed in the hangars.

Royal Flying Corps.—During last week the weather was against flying except on Wednesday and Thursday, when Lieuts. Cholmondeley, Carmichael and Anderson were out several times on the M. Farman 216 and Major Higgins on the BE 203. The undercarriage of the latter machine was damaged on the 13th inst.



Night Flying by the R.F.C.

OFFICERS of the Royal Flying Corps at Farnborough had a night out on the 12th inst., when some experiments in night flying were successfully carried out. At one time there were five biplanes in the air simultaneously.

Mr. Hamel has a Mishap.

ON Wednesday week, Mr. Gustav Hamel was at Penrhyn Park, Bangor, and a crowd of about 4,000 people turned up to see him fly. He made a fine start, but immediately found the wind was stronger than he anticipated. At a height of 100 feet a strong gust of wind caught the machine, and it dropped to the ground. Fortunately, the pilot escaped with nothing worse than cuts on the leg. He attributed the accident to the peculiar wind currents set up by the mountains.

"Flight" Editorial Staff.

THE Editor would like to hear from any gentleman able to represent FLIGHT in regard to the active and practical work in progress at the aerodromes, factories, &c. Address, The Editor, 44, St. Martin's Lane, W.C.



A reminiscence of the late Geoffrey England.—In sending us the above snap, Mr. C. Howard Pixton writes: "It was taken at Haywards Heath during my stop there on the 'Avro' in May, 1911, on my return from Brighton. It is an excellent photo of poor England. You will remember he was a well-known rider of 'Moto Reve' cycles before taking up aviation. He was later connected with Bradburys. 'Bradburys' machine is in this photo."

ARMCHAIR REFLECTIONS.

By THE DREAMER.

THERE is the picture of a bird in the school books that has got a lot to answer for. The bird I mean, not the picture.

I am not going to tell you his name, but he has got rather a fine tail (I had almost written tale). The two largest feathers run up on either side and curl over outwards at the top, and the smaller ones fill in between and form almost an exact resemblance to a three-stringed harp, and he passes his time in whispering in people's ears, hence his name.

When I was on Salisbury Plain last August, at 4 o'clock in the morning with a good heart and wet feet, saying nursery rhymes to keep myself warm, he came and whispered in my ear that these trials were for the purpose of finding out which were the best aeroplanes for the defence of the dear old white cliffs of England, and that orders would follow in due course. That course must have been due east by west. When he came and whispered the same thing to me at the recent aero show at Olympia I felt inclined to call him by name, but he said that this time it was to be high, wide, and sharp, and no waiting, but it seems to me we are much about where we were before.

Our manufacturers are, many of them, hanging on by a handful of moss, and unless something crops up very soon some of them will have to drop out before the orders arrive. There is no great fun in building machines for the excitement of watching one's bank balance dwindle.

With all these airships floating about every night one never knows what might happen. I should not be at all surprised to wake up one morning to find somebody had been over in the night and gone off with England. No doubt we shall come along with a fleet of aircraft in time, but we might be a day behind the fair.

It reminds me of the man who held on to the trail rope of a balloon just a bit too long and got lifted off his feet, he was so long making up his mind whether to jump or hold on, that when he *did* jump there was nothing to jump on. We appear to be at peace with all the world just now, but appearances are sometimes deceptive.

There seems to be a growing impression among pilots and others connected with aviation that the game is played out; that it is a waste of money to learn to fly; that there is no room for any more pilots; that some of those that have already got their brevets will soon be working for thirty shillings a week; and generally that the whole show has gone into the *ewigkeit*.

Now my impression is that aviation is going to be a very big thing indeed, and that there will be plenty of room at the top for pilots. Even now I have knowledge of pilots who are earning a thousand a year, although others have to be satisfied with four or five pounds a week. It is not always the stunt scrape-the-paint-off-the-top-of-the-enclosure-railings-with-one-wing flyer who gets the



AERONAUTICAL SOCIETY OF GREAT BRITAIN.

Official Notices.

Annual General Meeting.—The annual general meeting will be held on Wednesday, the 26th inst., at the Royal United Service Institution, Whitehall, at 8.0 p.m. A discussion will be opened at 8.30 p.m., on "The Effect of the Government Aeronautical Programme upon the Technical Industry."

Election.—Capt. Herbert Musgrave, R.E., has been elected a member of the Society.

BERTRAM G. COOPER, Secretary.



KITE AND MODEL AEROPLANE ASSOCIATION.

Official Notices.

British Model Records.

Hand-launched	Distance	A. E. Woollard	477 yards.
	Duration	A. F. Houlberg	89 secs.
Off ground	Distance	G. Rowlands	232 yards.
	Duration	A. F. Houlberg	51 secs.
Hydro, off water	Duration	G. P. Bragg-Smith	25 secs.
Single-tractor screw	Distance	F. G. Hindsley	173 yards.
hand-launched	Duration	J. E. Louch	44 secs.
Do., off ground	Duration	J. E. Louch	40 secs.

Official Trials.—The monthly official trials for the purpose of establishing records were held on Saturday, March 15th, on the Paddington and District Aero Club Ground, Sudbury. The day was not an ideal one for models, there being a 38- to 40-mile wind, but in spite of this some good flights were made. Mr. J. E. Louch, of North-East London Aero Club, established new records for single-screw tractor, hand-launched and off ground, for duration, doing 44 and 40 secs. respectively, which was a splendid performance in a 40-mile wind. The other flights by other competitors were not good enough to record, but a pleasant afternoon was spent in spite of the weather. The official observers were Messrs. W. H. Akehurst and W. E. Evans.

Annual General Meeting.—The annual general meeting will be held on Thursday, March 27th, at Caxton Hall, Westminster, at 7.30 p.m. Suggestions

best pay, and this kind of thing is only a passing fancy. There are pilots who take their craft out with the sense of responsibility of a captain on an ocean liner, who bring their ships into port with the regularity of railway trains, and these air pilots are the ones that have come to stay.

Be a Pilot with a capital P and you will be all right; aviation has come to stay as a serious thing, whatever may happen to the other sort which in itself shows no signs of falling off at present, but the reverse.

Whether the new regulations with regard to the flying of aircraft over this country are going to be effective or not remains to be seen. At any rate it is a move of sorts, and any move is better than the absolute indifference that seems to have been the order of the day up till now. There used to be a little rhyme something about Ireland was Ireland when England was a pup, which went on to say that Ireland would still be Ireland when England had ceased to exist, and no doubt England will still be England when we go to press next week. England has got a way of bundling up, and coming tumbling along just as the curtain goes up, but she has always got there in time to take her cue up to now. I once nearly won a big prize in a "bullets" competition (I said *NEARLY*) by taking the words "British pluck," and using the letter B and P, formed "Redeems Parliamentary Blunders," and although the editor evidently did not see the point, it was there right enough, as our "Tommies" always are, though nobody seems to notice it till they come to think it over afterwards when handing over chunks of unearned increment.

A man there was and he made his prayer,

Even as you and I,

To an engine with wings that chewed up air,

We closed both eyes, said "we don't care,"

But the man he knew it would "get him there,"

Even as you and I.

I feel rather concerned about what is going to happen to the Dover aerodrome over the new regulations, seeing that it is within the three miles' radius of Dover Castle. Under the circumstances there does not seem much chance of Channel flying, with Rye as about the nearest landing place. It seems to me they will have to come round that way and then try and sneak in by the "Tradesmen's Entrance" at the back. Or perhaps they will simply say "Press," which seems to get one almost anywhere. The best thing, perhaps, would be to get put on the "free list" otherwise they might stand a chance of getting potted (if ever we get anything to pot with), because mistakes will happen, even with the best regulated regulations, and it's of no use saying you were only waiting for a 'bus when they've got you in the short ribs.



for competitions for the year will be discussed after the general business. All such suggestions should be written and handed to the hon. sec. prior to the start of the meeting. It is felt by the council that this will give members an opportunity to give their views and be a great help to the competition committee, and therefore of more benefit to the association than a lecture.

27, Victory Road, Wimbeldon, S.W.

W. H. AKEHURST, Hon. Sec.



MODEL CLUB DIARY AND REPORTS.

CLUB reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Paddington and Districts (77, SWINDERBY ROAD, WEMBLEY).

TO-DAY (Saturday) flying at Sudbury. Prizes for best r.o.g. flight and best hand-launched flight. Easter Monday, flying from 10 a.m. Many competitions with prizes. Single and twin tractors, r.o.g. and hand-launched, also propeller-driven models, r.o.g. and hand-launched.

S. Eastern Model Ae.C. (1, RAILWAY APPROACH, BROCKLEY).

DURING Easter holidays flying at Blackheath, Kidbrooke, Mitcham, Lee, and at Vickers' Aerodrome, Erith. Hon. secretary will advise members of the times, by post.

Sheffield Model Aero Club (35, PENRHYN ROAD, SHEFFIELD).

EASTER MONDAY, flying 1 p.m., at the Standhouse Aerodrome, Intake. Events: Colver Cup, for r.o.g. models; tractor biplanes, for silver medal presented by Mr. M. D. Manton; exhibition gliding flights by Mr. G. H. Dewsnap. If weather unsuitable, Tuesday, 25th, same place and time. Members please see special notice in club-room on Sunday, the 23rd.

Yorkshire Ae.C. (Model Sec.) (53, WEST STREET, LEEDS).

MARCH 22ND.—Important meeting at Poppy Fields, Beeston.



Index and Title Page for Vol. IV.

THE index and title page for Vol. IV, January to December, 1912, has now been published and any reader can obtain a copy by sending 2d. to the publishers, 44, St. Martin's Lane, W.C. After March 22nd a charge of 6d., post free, will be made.

FOREIGN AVIATION NEWS.

The Ae.C.F. Criterium.

ALTHOUGH the Aero Club of France Criterium of 10,000 francs will this year again be awarded for the longest flight without landing the conditions will be different from last year, as the competitors will be required to cover the first 1,000 kiloms. over an out-and-home cross-country course. They may then continue their flight over a closed circuit above an aerodrome, and only completed circuits will be counted. Each competitor must carry at least two sealed barographs, and one record must be complete or the flight will not be recognised.

High Flying at Nice.

ON the 11th inst., Garros treated the spectators on the Promenade des Anglais at Nice to some of his very acrobatic flying. In one of his ascents he went up 3,100 metres in 15 minutes, and then made a very swift dive to within a short distance of the ground.

Long Flights with Clerget-Deperdussins.

AT Juvisy, on the 11th inst., Duval while flying on his Deperdussin monoplane with Clerget rotary motor made a flight of 1 hr. 7 mins. On the 12th, Capt. Aubry went from Rheims to Chalons Camp on his Clerget-Deperdussin, attaining a speed of 120 k.p.h.

Rhone Motors Doing Well.

GILBERT AND MOUTHIER on their Moranes, and Letort on his Farman have each been making splendid flights at Lyon and Amberieu. All the machines are fitted with Rhone motors. On the 14th, Gilbert went up 4,000 metres in 14 mins., while Letort took passengers above the Alps.

More Farman Superior Pilots.

OVER a course from Etampes to Angerville and back, Lemaitre on Sunday made a test for a superior certificate on a H. Farman biplane, and Corbeil went over to Pithiviers, but could not get back before dark. On the 12th inst., Marc made a test of 200 kiloms., from Etampes to Chartres, Vendome and back, while at Buc, Capt. Farges and Sergeants Carrus and Homeraïn each carried out their second qualifying flight for superior certificates.

Cross-Country on Deperdussins.

LIEUTS. LALANNE AND RADISSON, each with a passenger, on their 80-h.p. Gnome-Deperdussin, on the 14th inst. flew from Maubeuge to Rheims and back, a distance of 200 kiloms. On their return journey they were accompanied by Sergt. Verdier, who also carried a passenger.

A Hanriot Superior Pilot.

LIEUT. MENDES, on a Hanriot monoplane, on the 14th inst., started on a qualifying flight for superior certificate from Rheims. After flying for an hour against a strong wind he had to land at Chauny for petrol, and then proceeded to Amiens.

A Clerget Clement-Bayard.

GUILLAUX was flying a new Clement-Bayard monoplane, with 60-h.p. Clerget motor at Issy on the 14th inst., and made a flight of half-an-hour in very bad weather.

Caudrons for Chinese Army.

A NUMBER of the Caudron biplanes built to the order of the Chinese Government, were tested at Issy on the 13th inst., and the Chinese officials present expressed their satisfaction at the excellent performances of the machines.

Fine Work on Deperdussins.

AT the Deperdussin aerodrome near Rheims, Lieuts. Ragon and Adrian, and Sergt. Mavinkowitch each made a flight of an hour and a-half on the 12th inst., and Lieuts. Redelsperger and Devienne, and Capt. Fabre flew from Rheims to Mailly Camp, Vouziers, and back, and from Rheims to Amiens.

Caudron Biplanes at Boulogne.

LIEUTS. GERARD AND LEBIHAN and Sapper Jacquemart went from Crotoy to Boulogne on the 12th inst. One of the machines was a hydravion, arranged for alighting on water or land. It came down on the water several times before finally landing on the beach alongside the other two machines. The two officers returned to Crotoy the next day, while the Sapper went back on the 14th inst.

A Japanese Mission at Rheims.

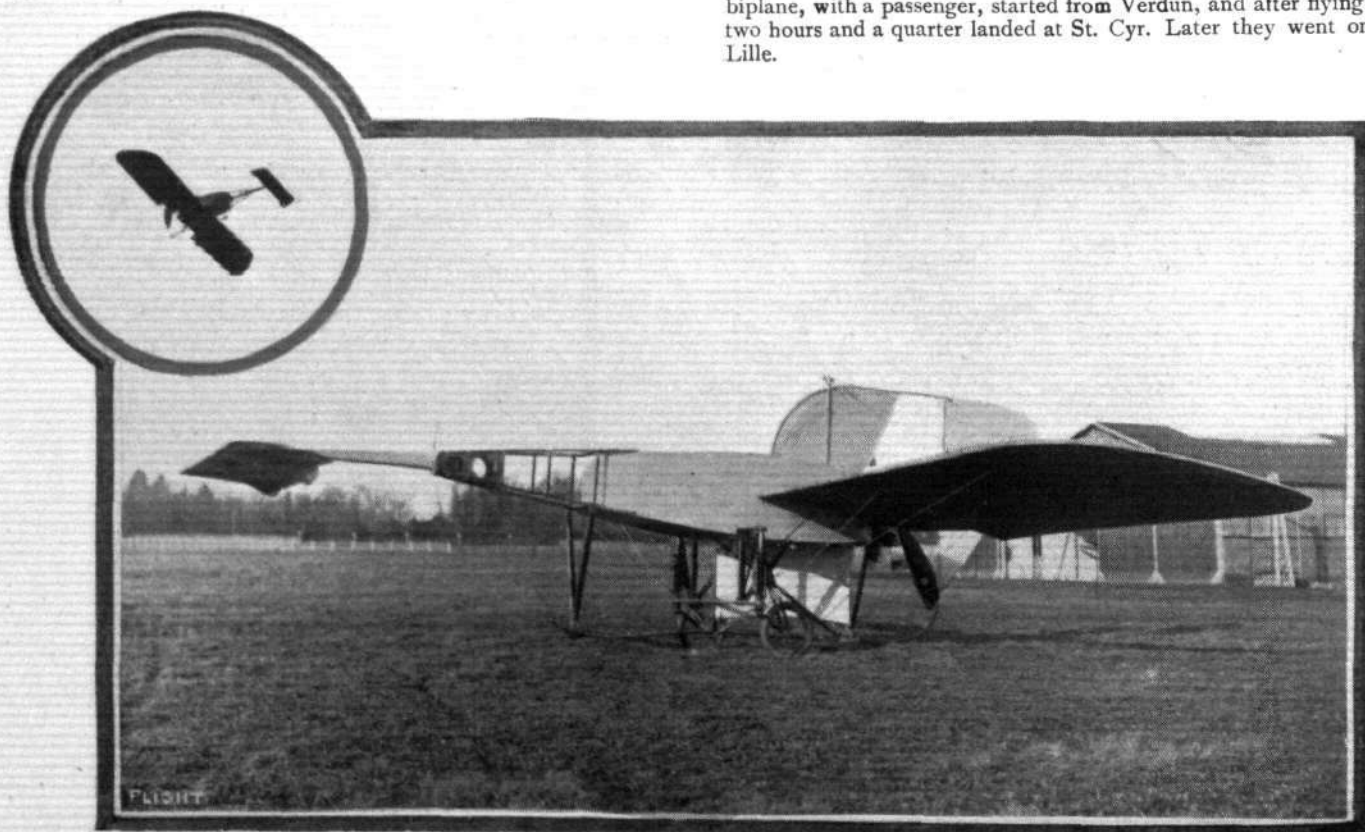
ON Saturday, a number of Japanese Government officials paid a visit to the Deperdussin aerodrome at Betheny, near Rheims, and spent a long time studying the works there. They also saw some very fine flying by Capt. Aubry on a two-seater Deperdussin.

More Farmans for French Army.

AT Etampes, on the 13th, Chevillard was testing a number of 50-h.p. M. Farmans, being part of an important order placed by the French military authorities. The proceedings were officially observed by a deputation from the Government centre of Chalais-Meudon.

Two and a Half Hours on a M. Farman.

ON the 13th inst., Lieut. Mauger-Devarenne, on a M. Farman biplane, with a passenger, started from Verdun, and after flying for two hours and a quarter landed at St. Cyr. Later they went on to Lille.



The new 70-h.p. Blériot "canard" monoplane, with which Blériot's chief pilot, Pereyon, has been experimenting at Buc, France, for some weeks past. The little inset picture shows the monoplane in flight.

A Caudron Superior Pilot.

SAPPER DEFOUGERE completed his qualifying tests for his military *brevet* on the 13th inst., flying on his Caudron biplane from Crottoy to Laon and back, a distance of 300 kiloms.

Long Trip on a Nieuport.

By way of terminating his course of tuition at the Nieuport school at Villacoublay, Lieut. de Challenge on the 13th inst. made a flight of an hour and a-half at a height of 500 metres.

To Try Paris-Madrid Flight Again.

SEVERAL aviators have their eye upon the next stage of the Coupe Pommery competition, and Brindejonc des Moulinais has sent in his entry. He proposes to try to fly from Paris to Madrid with landings at Bayonne, Victoria and Burgos. He will, of course, use a Morane-Saulnier monoplane.

Cross-Country on H. Farman Biplanes.

ON the 13th inst. Lieut. Blard arrived at Chalons camp on a 50-h.p. H. Farman, having flown over from Villacoublay, and Lieut. Rey, also on a Farman, arrived from Douai. Both officers were accompanied by passengers. Lieuts. Challe and Gensac left Chalons for Verdun in order to take part in some special manoeuvres.

Fatal Accident at Amberieu.

WHILE taking part in a series of exhibition flights at Amberieu on Sunday, Mercier had a fall and sustained injuries

from which he died almost immediately. The accident appears to have been caused by an attempt to glide while turning.

Flying from Venice to Rome.

ON the 11th inst., Widmer, who has twice flown from Trieste to Venice on his Blériot monoplane, started from the latter place for Rome. In 1 hr. 40 mins. he got to Ravenna and later in the afternoon went on to Ancone, thus completing the first stage of 300 kiloms.

Flying in Switzerland.

BIDER, on his Blériot, flew with his brother from Bale to Berne in 50 minutes on the 11th inst. He afterwards carried several prominent persons for flights on his machine. Audemars intended to try and beat the Swiss height record, but after mounting 1,000 metres in 40 minutes found the wind too strong.

Blériots for Italian Army.

ON Sunday, the Blériot pilot Perreyon was at Mirafiori, and in the course of testing some Blériot monoplanes for the Italian Government made a flight of three hours.

More Schools for Russian Army.

THE Russian military authorities have now decided to start three schools for the training of military aeroplane pilots, and they will be established at Moscow, Odessa and Omsk in Siberia. It has also been decided that non-commissioned officers and men shall be instructed as pilots.

FLYING IN CEYLON.

ACCORDING to reports that have reached us, MM. Maré Pourpre and George Verminck, two Blériot pilots who have been giving flying exhibitions in Ceylon, have been rather severely handled by the Government authorities there.

It appears that they were given permission to carry out their flights at the Colombo racecourse on the understanding that they confined their flying to the immediate neighbourhood of the ground. This they did not do, and so the trouble arose. The flights that MM. Pourpre and Verminck made on December 10th last constitute the first real flights that have been observed by the public of Ceylon. Despite the wind, M. Marc Pourpre ascended on his 50-h.p. Gnome-Blériot "La Curieuse," and flew two circuits. His second circuit took him well outside the boundaries of the ground in the direction of Bambalapitiya. The flights—for M. George Verminck flew as well on his two-seater Blériot—were well received. No criticism was made, however, of the fact that both men, M. Pourpre especially, had paid little heed to the understandings under which they were permitted to fly. Perhaps it was in some measure due to this that, the next day, M. Pourpre, giving an exhibition flight, circled once round the ground and set off towards the sea. Returning, he passed over the harbour and the forts, on Galle Face and Galle Buck.

Soon after he had landed he was met by the superintendent of police and the conversation that ensued undoubtedly had reference to M. Pourpre's breach of agreement. Later, the aviators were informed that they were to make no further flights until the matter had been fully considered by the Governor.

While we have little sympathy with anyone who so deliberately commits a breach of faith, we cannot help thinking that the authorities might have gone to work in a less antagonistic spirit. From reports, it seems that the police placed the aeroplanes "under arrest," for a military officer in mufti was put on duty at the entrance of the tent hangar. Meanwhile, inside, the superintendent of police conducted a minute examination of the machines to determine if any cameras were concealed about them. The police even went to the extent of turning M. Pourpre's aviation suit inside out in their search for evidence. Nothing was found in the hangar,

however, but the police seized two cameras and some two dozen plates belonging to the aviators. They were developed and found to be nothing more serious than the usual collection of views that travellers obtain going from one place to another.

Further, the police informed M. Pourpre that they would retain the 1,500 rupees that he had deposited as a guarantee that he would make good any damage that might be done to public property.

Taking things all round, M. Pourpre was indignant—indignant that his deposit was to be retained, and indignant to think he was being regarded as a spy. He remarked that when he flew over the Channel and landed at Dover he saw the whole of the Harbour and Dover Castle from above. But he was treated in a most cordial fashion by the officers stationed there, and they even started up his propeller for him the next morning when he resumed his flight.

Eventually, MM. Marc Pourpre and George Verminck called on the Acting Colonial Governor, Mr. L. W. Booth, and gave a satisfactory explanation of their conduct. Their explanation was accepted by His Excellency the Governor, and they were given permission to resume their flights on signing an agreement which clearly defined the districts over which they were not to fly.

M. Pourpre, when interviewed afterwards by a representative of the *Ceylon Observer*, remarked that when they arrived at Colombo they were given permission to fly. The authorities could not have done otherwise. How could they prevent flying? "There are certain places over which we are not allowed to fly," M. Pourpre said, "but I have never seen Colombo mentioned in the list at all. If they had told me it was a fortified place I give you my word of honour that I would never have gone."

He produced his pilot's certificate which, as everyone knows, bears the following request in the English, French, German, Spanish, Russian and Italian languages: "The Civil, Naval and Military Authorities, including the Police, are respectfully requested to aid and assist the holder of this certificate."

"I showed my certificate to the authorities when I arrived," he said, "and they saw how it was worded. Instead of doing what they did, they ought to have helped us."

The Wright Patents in France.

A DECISION was given in the French Court of Appeals last week confirming the favourable decision of the lower Court as to the validity of the Wright patents in France. Not only so, but, we understand, this latest judgment declares, in addition, that the Wright patents cover not only all the forms of flexing wings, but also flexible wings combined with a vertical rudder at the rear.

Portable Hangars and Garages.

AT Farnborough, on Monday, a demonstration before the officers of the Royal Flying Corps was given of the advantages of the new system of portable hangars, invented by M. Hervieu. One tent, large enough for a 40 ft. aeroplane, was erected in well under half an hour by a party of seven, including half a dozen men of the R.F.C. Subsequently it was dismantled and packed up ready for transport in ten minutes. The framework is of steel tubing, and is so arranged that when dismantled the hangar mentioned packs

up into three boxes 12 ft. long by 1 ft. square. The tents, of course, have a good many other uses, such as for garages, hospitals, &c., and a large number have been ordered by the French Government. They are being introduced into England by Messrs. Delacombe and Marechal.

Hydro-Aeroplaning at the Cape.

SOME particulars are just to hand from South Africa of the further efforts of Mr. Compton Paterson in furthering the cause of aviation in the Colony. During February he made arrangements with the Capetown Municipality to give a series of exhibition flights over Table Bay on his biplane "Pat," which he has converted into a hydro-aeroplane by fitting two main floats to the chassis. On several days the machine was out for an hour at a time, and rose from and alighted on the water in splendid style. On this machine, which he built himself, Mr. Compton Paterson has flown over 3,000 miles.

Models

Edited by V. E. JOHNSON, M.A.

Some Lessons from the Flying Tests at Hendon.

WE have received the following communication and accompanying sketches from Mr. James McBirnie. The account which Mr. McBirnie gives of his models' performances contains several points of especial interest; we therefore print it *in extenso*, together with some remarks on the points raised therein.

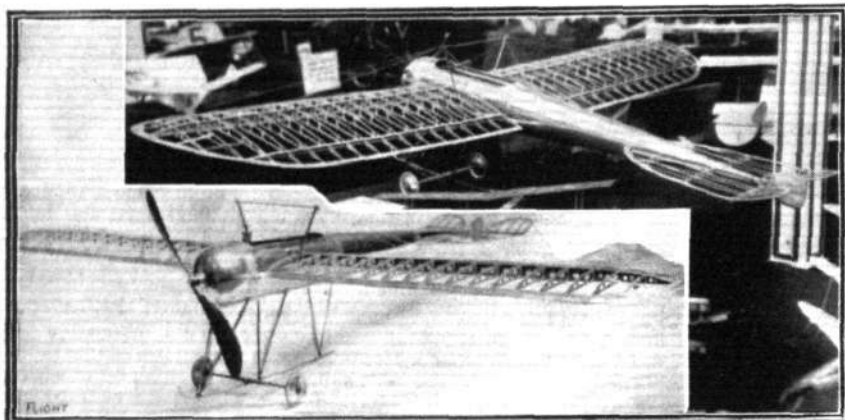
"*Hydro-aeroplane*.—This was not successful in actual flight—firstly because I made the mistake of endeavouring to obtain a long duration flight by attaching a coarse-pitched pair of propellers, necessitating a longish run before rising. This would have

weakened the float support, *i.e.*, we should say there was some small constructional error here; a hydro-aeroplane is a machine which should be specially designed to be waterproof in every part. In not a few cases even the flotation tests applied at Olympia clearly showed that even in such a "vital" part as the floats absolute watertightness had not by any means been achieved.

Referring to our correspondent's remarks on his r.o.g. biplane, "remarkably" stable is a very strong term to apply, a term which, we are afraid, we should have some hesitation in applying to any model.

Generally speaking, we think aeromodellists are somewhat too prone to attach too much importance to some particular shape of wing, fin, wing extension, special form of camber, &c., &c., and too little weight to the factor which *speed* plays in the steadiness of flight exhibited by their models. Taking quite an unbiased view—and calling any model having a speed in calm air of over 15 m.p.h. a quick-flying model—it is a matter of ordinary observation that in general such models do exhibit a noteworthy steadiness in flight; many of these models differ markedly in both design and construction, but they have all one factor in common, that of speed. In making the above remarks we do not in any way question the effectiveness of the devices used in this or in any other case to secure additional steadiness or stability (the two things are not, of course, necessarily the same, although very often confused). We have a very clear recollection of the flights made by Mr. McBirnie's model, and the stability was decidedly good.

It would certainly be an interesting competition for the coming season to have one for stability and *slowness* of flight, a model for instance with a soaring velocity of 10 miles an hour or under, which could make a good steady flight on a day like the one at Hendon, could, we think, truly be termed a "remarkably" stable model.



Mr. Desoutter's model.

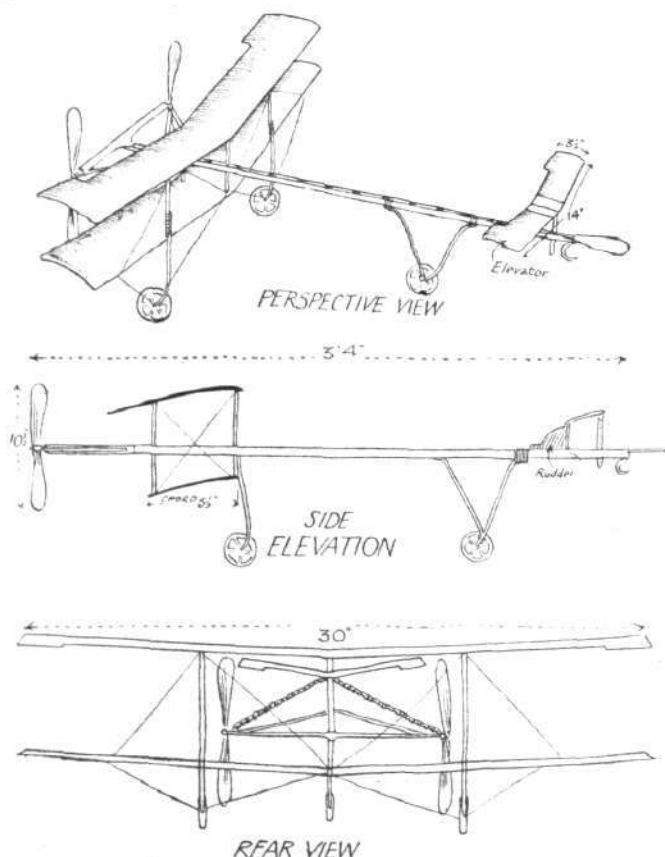
been successful had the water been calm—but as it was, the rough water was against it, while on the other hand a smaller diameter and a finer pitched pair of propellers would have forced the model upwards almost immediately. For the second and third trials I added more rubber, but the extended immersion after the first trial, besides adding considerable weight, had made the model rather sloppy and weakened the float support, so that although the model rose from the water at the third trial, one of the main floats swung inwards causing the model to tilt over and the wind assisting . . . disaster.

"*R.O.G. Biplane*.—This model was quite successful in flight and remarkably stable, considering the rough wind. I find that the large span, together with the tip extension on the upper plane, assists both the lateral and longitudinal stability, respectively while the position of the elevator, 3 ins. above the fuselage, is a considerable advantage; the duration of flight was not excessive, owing to the model being heavy (10 ozs.) for the power applied. I might mention here that the rudder, although not called into use on the occasion specified, is very effective in the position underneath and slightly at the rear of the elevator.

"*Hand-launched Monoplane*.—This was not successful, *i.e.*, from a hand-launched point of view, its best performance being, I believe, 35 secs. duration. The model was 4 ft. in length and weighed over 7 ozs. I was rather surprised at not getting a greater duration out of this model, and, although I added more rubber, no appreciable advantage accrued. I find that, while I can get a 90-sec. duration with a 4-ft. model weighing about 5 ozs., a 7-oz. model of the same length does not give half the result. I account for it in the inevitable sagging of the heavier skein of rubber."

Commenting on the foregoing, we must first congratulate Mr. McBirnie on the use of the expression, "I made the mistake," the usual expression to which we are accustomed being, "I had such rotten luck, you know," &c., &c.

We quite agree with our correspondent's remarks *re* position of elevator and fine and coarse pitched propellers. Considering the time of year, the average condition of the water at the Welsh Harp and the atmospheric conditions prevalent on the day of the contest, he undoubtedly made an error of judgment in this case, and we believe we are not wrong in saying that he was not the only competitor who did so. We might also add that the type of float employed in this case requires more power to get the model off rough water than the type employed by Mr. Williams. Of course, the immersion should not



A model by Mr. James McBirnie.

In the power-driven model contest, so far as any conclusions can be drawn with reference to stability, we have only two models to judge from—the French one driven by a compressed air motor, and Mr. Groves' monoplane. The former machine was clearly under-powered, and lacked all stability due to speed apart from any stability it might possess due to other causes, which certainly we must admit appeared to be very little indeed. Mr. Groves' monoplane was a fast machine—as was proved by the manner in which it climbed when flying with the wind. It therefore possessed a good stability due to its speed—apart from other causes; that it was successful in launching itself, and in rising against the wind, and in turning steadily into it is a proof that it was a model possessed of good stability in the matter of design and construction. It is much to be regretted that a broken crankshaft (and not as we thought a loose pin in one of the connecting-rods) prevented the slower-flying biplane being used, as it would have been most interesting to have seen how this machine behaved in actual flight on a gusty day, because this would have been a much more severe test of stability. The reader must not come to the erroneous conclusion that the above remarks are in any way intended to disparage the stability of a model due to speed—the very reverse is the case. In gusty weather it is undoubtedly the most potent factor, and the best one to make use of; and, in the case of a full-sized machine, the possession of a good reserve of engine power and the possibility of accelerating at will is undoubtedly one of the best methods which make for safety—even if it be not the best.

The contests at Hendon once again raised the everlasting question of biplane *vs.* monoplane, and several aeromodellists expressed the opinion to the writer that the advantage lay with the monoplane. It is certainly true that the three principal events were all won by monoplanes. In gusty or windy weather it is quite possible the advantage lies with the swifter-flying monoplane; but the last word has not yet been said.

Referring to Mr. McBirnie's remarks on his hand-launched model, we can scarcely follow him in his remarks *re* the sagging of the rubber—this is a matter which can surely be easily overcome by a central support; a wire-loop or ring being the device generally employed. We should be glad, however, to hear from other flyers of hand-launched machines as to how far they agree or disagree with him *re* his remarks on the respective durations of 5-oz. and 7-oz. models. That there should be some difference one can understand, but that that difference should be more than 50 per cent. seems absurd. We should also be glad to know the respective weights of Mr. Houlberg's and Mr. Louch's models, with any other particulars they may care to send along.

A Repairing Case for Aeromodellists.

We have received from the Broadstairs Model Construction Co. a sample case of the above, which they are placing on the market. As the vendors say: "It is most annoying when flying models to have minor breakages, which for lack of materials, tools, &c., cannot be repaired on the spot, and we find that quite a large number of modellists carry their repairing gear in their

pockets, though they not unfrequently manage to forget some indispensable article."

The case (which is provided with a handle) contains pliers, binding wire, thread, glue, pieces of bamboo, wood and aluminium tubing, nails, hammer, piano wire, 2 shafts, 15 S.W.G., elevator wood, bearings, feather-weight washers, screw eyes, lubricant, propeller blanks, &c.

The idea is undoubtedly an excellent one, and the assortment has evidently been carefully chosen. One important matter has, however, been overlooked—the pliers should be fitted with cutters, a most important item in dealing with wire. A soldering set, which could be used on the spot, would undoubtedly greatly enhance the value of the set; naturally it would raise the price (which at present is 5s.) somewhat, but some would undoubtedly be prepared to pay it. A few small drills with holder would again be a most useful adjunct.

Mr. W. H. Norton's Torpedo Hand-Launched Model.

Mr. Norton (Redhill and Reigate District Model Club) writes us with respect to his model of the above type exhibited at Olympia, "I thought I would let you know I had my torpedo h.l. model out, and got about 120 yards with 250 turns, the first flight without adjusting the elevator (just as it came from Olympia)—a straight flight. The model will no doubt be improved with a slight increase of rubber. I was very satisfied with the result, as it was practically an original type. It reminds one of an owl—very quiet and steady."

The Hand-Launched Durations at Hendon.

Mr. J. E. Louch writes informing us that it was his model which made the 79 secs. duration at Hendon on March 1st, and Mr. Houlberg's the 54 secs., and not the reverse as stated in last week's issue. Mr. Louch also made another duration of 61 secs.; he also states that on Saturday he was successful in making the following official tractor (single-propeller) records, viz., hand launched, 44½ secs.; rising from the ground, 40½ secs. The former records being 36 secs. and 21 secs. respectively. Both the new records thus show a considerable advance on the old, more especially the latter.

Query.

H. Oliver desires to know a good recipe for a home-made lubricant. Perhaps some reader will kindly oblige.

Replies in Brief.

A. LIVERPOOL.—The straight edge of the propeller block should be away from the rubber hook, and not on the same side as you have drawn it. The two blades must then be given a twist in opposite directions—best done on a former which should be so shaped as to make the blades slightly hollow-faced. If you are only just commencing model work, we should strongly recommend you to make use of carved propellers of a rather fine pitch—a tip angle of not more than 22½ degrees. These can be purchased quite cheaply. The making of a really good and efficient bent-wood propeller is by no means so easy as it seems.

CORRESPONDENCE.

. The name and address of the writer (not necessarily for publication) MUST in all cases accompany letters intended for insertion, or containing queries.

Correspondents communicating with regard to letters which have appeared in FLIGHT, would much facilitate ready reference by quoting the number of each letter.

Tuition.

[1740] As your paper in the past has done so much for the cause of aviation by the fearless way in which it applied criticism where criticism was most needed, irrespective of party, might I draw attention to a seemingly minor but none the less important matter? I refer to the manner in which many of our aviation schools are conducted.

If flying is ever to pass beyond the exhibition stage in this country, some better and quicker system of tuition than that which is most generally in vogue over here must be adopted; otherwise there is the danger of there being a considerable shortage of qualified pilots at a time when they will most be required. A distinguished military officer has lately told us that the wastage of aviators will be tremendous in the next war; yet in our usual British style we muddle along at the rate of two or three certificates a week, although there is no lack of young men who are willing to qualify themselves at considerable expense, to say nothing of personal risk. Surely the fault lies somewhere else than with these volunteers.

The novice inspecting the machines in the hangar for the first time, while listening to the glowing accounts of the school-manager, pictures himself soaring above the clouds within a month or so after

joining the school. He is ignorant of the fact that the majority of school machines are "bus's" fitted with engines of such low power that even in the most capable of hands it is doubtful whether they could rise off the ground for more than a few yards at a stretch, and also that they are highly dangerous in any other weather but a dead calm. At first his enthusiasm is unbounded; he takes rooms close to the aerodrome gate, and spends the day from dewy dawn till starry eve hanging about the ground waiting for the wind to drop or the fog to clear; and if he gets in an hour's practice in a week he is exceedingly lucky. As time goes by he very naturally tires of this loafing around, and in the majority of cases removes to a neighbourhood less inconveniently situated for the purposes of daily life. Later, perhaps, he will ask himself whether the ability to roll laboriously over a marshy field on a windless day without injury to himself or the fragile school-bus is what he has paid a handsome fee to attain.

One could name dozens of pupils at the present time who after six months of tuition have not passed beyond the "hopping" stage, although there has been no lack of keenness upon their part. Is it any wonder that many men get disgusted and drift away, preferring to lose their initial fee altogether rather than waste further time in learning a calling which at its very best holds out no particularly brilliant prospects? Presumably aviation schools are run for profit like other business concerns, but one questions

